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sensoria. Eyes without ocular tubercles. Oviparous female apterous.

GENUS PEMPHIGLACHNUS Knowlton.

Ann. Ent. Soc. Amer., xxi, p. 264 (1928).

Genotype.—*Pemphiglachnus kaibabensis* Knowl.

Near to *Tamalia* Baker, differing in the shape of the cauda, the not minutely setose antennae, etc.

(Subtribe *Lizerina*.)

GENUS LIZERIUS Blanchard.

Physis, vii, p. 120 (1923).

Genotype.—*Lizerius ocoteae* Blanchard.

Blanchard has erected the tribe Lizerini for this aphid, but I treat it as a subtribe of the tribe Callipterini.

(Subtribe *Callipterina*.)

GENUS BETULAPHIS Glendenning.

Can. Ent., lviii, p. 96 (1926).

Genotype.—*Betulaphis occidentalis* Glend.

Closely related to *Calaphis* Walsh, differing in the shape of cauda.

GENUS CEPEGILLETTEA Granovsky.

Proc. Ent. Soc. Wash., xxx, p. 114 (1928).

Genotype.—*Cepegillettea betulaeifoliae* Granov.

GENUS CALLIPTERINOLA Strand.

Arb. aus Syst.—*Zool. Inst. Lettlaend. Univ.*, No. 27, p. 47 (1928).

Genotype.—*Callipterus juglandis* Frisch.

Strand proposed this new name for Callipterous Koch, since Koch's name was preoccupied by *Callipterus* Agassiz (*Nomencl. Zool. Index*, 1846, p. 59).

GENUS SAPPOCALLIS Matsumura.

Trans. Sapporo Nat. Hist. Soc., vii, p. 107 (1919).

Genotype.—*Sappocallis ulmi* Mats.

Differs from all the other genera of this subtribe in the only once branched media of the front wing.

GENUS TELOCALLIS Shinji.

Dobutsugaku Zasshi, xxxiv, p. 731 (1922).

Genotype.—*Telocallis alnifoliae* Shinji.

I have not studied the specimens and the description is too brief, but judging from the accompanying figure, this genus must be regarded as a synonym of *Sappocallis* Matsumura.

GENUS PTERIAPHIS Gaumont.

Ann. Epiph., ix, p. 342 (1923).

Genotype.—Not indicated.

No species of the genus is mentioned. Gaumont distinguishes this genus from *Myzocallis* Pass. by the absence of capitate hairs on the body. This character is nothing more than specific in my opinion and *Pteriaphis* must be now regarded as a synonym of *Myzocallis*.

GENUS MELANOCALLIS Oeslund.

19th Rept. St. Ent. Minnesota, p. 136 (1922).

Genotype.—*Callipterus caryaefoliae* Davis.

This aphid is a *Myzocallis*, and the genus sinks as a synonym.

GENUS TINOCALLIS Matsumura.

Trans. Sapporo Nat. Hist. Soc., vii, p. 100 (1919).

Genotype.—*Tinocallis ulmiparvifoliae* Mats.

The genotype possesses transversely narrowed sensoria, but this is specific in my opinion and the genus becomes a synonym of *Myzocallis* Pass.

GENUS TUBEROCALLIS Nevsky.

Zool. Anz., lxxxii, p. 221 (1929).

Genotype.—*Tubercallis salians* Nevsky.

The secondary sensoria are transversely narrowed, but in my opinion this is a specific character and I regard this genus as a synonym of *Myzocallis* Pass.

GENUS MESOCALLIS Matsumura.

Trans. Sapporo Nat. Hist. Soc., vii, p. 103 (1919).

Genotype.—*Mesocallis sawashibae* Mats.

The stigmatic vein is absent, but this is nothing more than a specific character in this subtribe. All the characters indicate that this aphid is a *Myzocallis*.

GENUS NEOCALLIS Matsumura.

Trans. Sapporo Nat. Hist. Soc., vii, p. 104 (1919).

Genotype.—*Neocallis carpinicola* Mats.

This genus is a synonym of *Myzocallis* Pass. Matsumura described the sexual forms as viviparous females.

GENUS SARUCALLIS Shinji.

Dobutsugaku Zasshi, xxxiv, p. 730 (1922).

Genotype.—*Sarucallis lythrae* Shinji.

Judging from the very brief description the genotype seems to be *Myzocallis kahawaluokalani* Kirk., the genus sinking as a synonym.

GENUS LUTAPHIS Shinji.

Dobutsugaku Zasshi, xxxvi, p. 346 (1924).

Genotype.—*Lutaphis nirecola* Shinji.

The description is too short, but the genus seems to be a synonym of *Myzocallis* Pass.

GENUS RECTICALLIS Matsumura.

Trans. Sapporo Nat. Hist. Soc., vii, p. 106 (1919).

Genotype.—*Recticallis alnijaponica* Mats.

Differs from *Myzocallis* Pass. in the presence of very short, but distinct, frontal tubercles, as well as in possessing a protuberance on the apical part of the inner side of the first antennal joint. This genus is also different from *Calaphis* Walsh in the deeply bilobed anal plate and in the character of the first antennal joint.

Myzocallis yokoyamai Takah., *M. querciformosanus* Takah., *M. nigra* Okam. et Takah., and *M. pilosus* Takah. must be removed to *Recticallis*.

GENUS NEOCHROMAPHIS Takahashi.

Japanese Aphididae, I, p. 28 (1921).

Genotype.—*Neochromaphis carpini* Takah.

Closely related to *Chromaphis*, differing in having large wax-plates on the abdomen.

GENUS CHAITOCALLIPTERUS Theobald.

Plant Lice Brit., ii, p. 329 (1927).

Genotype.—Not indicated.

No description is given of the genus, not mentioning any species of it. According to the key, this genus differs from *Symydobius* Mordvilko in having longer hairs on the body. This character seems to be specific.

GENUS QUIPPELACHNUS Oestlund.

19th Rept. St. Ent. Minnesota, p. 134 (1922).

Genotype.—*Euceraphis gillettei* Davidson.

Judging from the description of *Euceraphis gillettei* it seems unnecessary to separate this species from *Euceraphis* Walk., and I regard Oestlund's genus as a synonym. The distal part of the last antennal joint is a little shorter than the base, but this is a specific character.

(Subtribe *Saltusaphidina*.)

GENUS PHYLLAPHOIDES Takahashi.

Aphididae of Formosa, part 1, p. 75 (1921).

Genotype.—*Phyllaphoides bambusicola* Takah.

Differs from *Thripsaphis* Gillette in the following characters: Head not protruding on the front. Antennae not minutely setose. Hind wings with 2 obliques. Body with cottony secretions, lacking spine-like setae.

GENUS ALLAPHIS Mordvilko.

Puceron des Gram., i, p. 57 (1921); *Bull. Ent. Res.*, xiii, p. 32 (1922).

Genotype.—*Allaphis caricis* Mordvilko.

This genus is synonymous with *Thripsaphis* Gillette.

(Subtribe *Drepanosiphina*.)

GENUS CHAITOPHORAPHIS Shinji.

Dobutsugaku Zasshi, xxxv, p. 307 (1923).

Genotype.—*Chaitophoraphis acerifloris* Shinji. (This species is a synonym of *Drepanaphis tokyoensis* Takah.)

This genus is different from *Drepanaphis* Del Guercio in that the cornicles are curved, and swollen at the middle.

GENUS MIMOCALLIS Matsumura.

Trans. Sapporo Nat. Hist. Soc., vii, p. 109 (1919).

Genotype.—*Mimocallis betulijaponicae* Mats.

The type species is apparently a *Drepanaphis* and this genus becomes a synonym.

GENUS BETACALLIS Matsumura

Trans. Sapporo Nat. Hist. Soc., vii, p. 110 (1919).

Genotype.—*Betacallis alnicolens* Mats.

This genus is a synonym of *Drepanaphis* Del Guercio.

(Subtribe *Chaitophorina*)

GENUS LAINGIA Theobald.

Bull. Ent. Res., xii, p. 429 (1922).

Genotype.—*Laingia psammae* Theob.

Near to *Sipha* Pass. and *Atheroides* Haliday, differing in the shape of cauda.

(Subtribe *Pterocommina*.)

GENUS PLOCAMAPHIS Oestlund.

19th Rept. St. Ent. Minnesota, p. 122 (1922).

Genotype.—*Melanoxanthus flocculosus* Weed.

The type species possesses cornicles slightly swollen and abruptly constricted at the apex. I regard this genus as a synonym of *Clavigerus* Szépligeti.

(Subtribe *Paoliellina*, new subtribe.)

GENUS PAOLIELLA Theobald

Bull. Ent. Res., xix, p. 177 (1928).

Genotype.—*Paoliella hystrix* Theob.

This aphid apparently belongs to the tribe Callipterini, but is very peculiar in being provided with many spines and 3-faceted eyes, and I propose a new subtribe for it. The eyes of the apterous forms of the subtribes Neophyllaphidina and Lizerina are also of 3 facets.

GENUS CTENOCALLIS Klodnitzki.

Trans. 4th All Russ. Ent. Phytopath. Meet. Moscow, p. 61 (1922).

Genotype.—*Ctenocallis dobrovljanskyi* Klodn.

I have not been able to secure a copy of the description. The position of this aphid in the tribe Callipterini is not known to me.

TRIBE GREENIDEINI.

GENUS GOODEA Shinji.

Dobutsugaku Zasshi, xxxiv, p. 731 (1922).

Genotype.—*Goodea narafoliae* Shinji.

This genus is synonymous with *Eutrichosiphum* Essig et Kuwana.

TRIBE CERVAPHIDINI.

GENUS DIVEROSIPHUM Shinji.

Dobutsugaku Zasshi, xxxiv, p. 791 (1922).

Genotype.—*Diverosiphum kunugii* Shinji.

The type species is identical with *Cervaphis quercus* Takah., the genus sinking as a synonym of *Cervaphis* van der Goot.

TRIBE SETAPHIDINI.

GENUS CERCIAPHIS Theobald.

Bull. Ent. Res., xi, p. 70 (1920).

Genotype.—*Cerciaphis bougainvilleae* Theob.

This genus is a synonym of *Setaphis* van der Goot.

GENUS BRASILAPHIS Mordvilko.

Chacaras e Quintas, xxx, p. 115.

Genotype.—*Brasilaphis bondari* Mordv.

I have noticed this genus in Moreira's paper, but have not been able to secure a copy or any details of the description.

TRIBE APHIDINI.

(Subtribe *Aphidina*.)

GENUS NEOACAUDUS Theobald.

Plant Lice Brit., ii, p. 326 (1927).

Genotype.—*Acaudus bipapillata* Theob.

The genotype of *Acaudus* van der Goot is an *Anuraphis*, *Acaudus* sinking as a synonym, and this new name was proposed for *Acaudus bipapillata*. The generic name *Acauda* used by Shinji (*Dobutsugaku Zasshi*, xxxvi, p. 353) is perhaps a lapsus of *Acaudus*.

GENUS AMPHICERCIDUS Oestlund.

19th Rept. St. Ent. Minnesota, p. 126 (1922).

Genotype.—*Aphis puberulens* Gillette.

According to Gillette the cornicles of the type species are short, cylindrical and not swollen, and the cauda is short and

broadly rounded, and I regard this genus as a synonym of *Neoacaudus* Theobald.

GENUS BRAGGIA Gillette et Palmer.

Ann. Ent. Soc. Amer., xxii, p. 28 (1929).

Genotype.—*Braggia echinata* Gillette et Palmer.

Very closely related to *Anuraphis* Del Guercio, differing only in having heavy blunt hairs on the apterous form. The distal part of the last antennal joint is as long as the base, but this is nothing more than a specific character.

GENUS CEDOAPHIS Oestlund.

19th Rept. St. Ent. Minnesota, p. 127 (1922).

Genotype.—*Aphis symphoricarpi* Thomas.

The type species differs from the typical *Anuraphis* in the longer cornicles, but such a character is specific in my opinion, and the genus must be a synonym of *Anuraphis* Del Guercio.

GENUS XEROBION Nevsky.

Acta Univ. Asiae Mediae, ser. viii-a, Zool. 3, p. 22 (1928).

Genotype.—*Xerobion eriosomatnum* Nevsky.

This genus seems to be not different from *Anuraphis* Del Guercio.

GENUS CERURAPHIS Börner.

Abderhalden's Handb. biol. Arbeitsm., Abt. ix, Teil i-st, p. 226 (1926); *Franssen, Aphis fabae Scop.*, p. 55 (1927); *Roepke, Stett. Ent. Zeit.*, lxxxix, p. 25 (1928).

Genotype.—*Aphis viburnicola* Gillette.

The type species belongs to *Anuraphis* Del Guercio in my opinion, the genus sinking as a synonym of *Anuraphis*. The characters given by Franssen are specific. *Anuraphis viburnicola* Gill., *A. viburniana* Frans., *Macrosiphum smilacicola* Takah., and several species of *Chaitophorus* possess sensoria on the hind tibiae of the viviparous females.

GENUS LACHNAPHIS Shinji.

Dobutsugaku Zasshi, xxxiv, p. 729 (1922).

Genotype.—*Lachnaphis yomogi* Shinji.

The description is too short, but this aphid seems to be a synonym of *Anuraphis* Del Guercio.

GENUS ACAUDELLA Nevsky.

Zool. Anz., lxxxii, p. 211 (1929).

Genotype.—*Acaudella puchovi* Nevsky.

Differs from *Neoacaudus* Theobald in the 5-jointed antennae and the cornicles swollen about the middle, with expanded tips.

GENUS ANURIELLA Del Guercio.

Redia, xiv, p. 115 (1921).

Genotype.—*Anuriella dorsolineata* Del Guercio.

Differs from *Anuraphis* in the longer clavate cornicles.

GENUS APHIDIELLA Theobald.

Ent. Mth. Mag., ix, p. 105 (1923); *Plant Lice Brit.*, ii, p. 219 (1927).

Genotype.—*Aphidiella secretocauda* Theob.

Differs from *Anuraphis* in the longer reticulated cornicles and in the triangular cauda.

GENUS GYPSOAPHIS Oestlund.

19th Rept. St. Ent. Minnesota, p. 126 (1922).

Genotype.—*Aphis lonicerae* Monell.

Closely related to *Anuraphis* Del Guercio, but differs in the shorter cornicles which are broader than long. According to the figure of Davis, the anal plate is conical.

GENUS HEMIAPHIS Börner.

Abderhalden's Handb. biol. Arbeitsm., Abt. ix, Teil i-ii, p. 226 (1926).

Genotype.—*Aphis trirhodus* Walk.

The type species is the same with that of *Longicaudus* van der Goot, and this genus must be a synonym.

GENUS BREVICORYNELLA Nevsky.

Acta Univ. Asiae Mediae, ser. viii-a, Zool. 3, p. 21 (1928).

Genotype.—*Brevicorynella quadrimaculata* Nevsky.

Differs from *Brevicoryne* van der Goot in lacking ocular tubercles and in the very short distal part of the last antennal joint.

GENUS MIRAPHIS Nevsky.

Acta Univ. Asiae Mediae, ser. viii-a, Zool. 3, p. 25 (1928).

Genotype.—*Miraphis agabiformis* Nevsky.

Near to *Brevicoryne* van de Goot and *Hyalopterus* Koch.

GENUS APHIDULA Nevsky.

Zool. Anz., lxxxii, p. 208 (1929).

Genotype.—*Aphidula althaeae* Nevsky.

This genus is apparently a synonym of *Cerosipha* Del Guercio.

GENUS BRACHYSIPHONIELLA Takahashi.

Aphididae of Formosa, part 1, p. 61 (1921).

Genotype.—*Brachycolus gramini* Takah.

Closely related to *Brachycolus* Buckton, differing in the very long cauda rounded at the apex and constricted about the middle.

GENUS PSEUDOLACHNUS Shinji.

Dobutsugaku Zasshi, xxxiv, p. 730 (1922).

Genotype.—*Pseudolachnus yomogi* Shinji.

This genus is a synonym of *Cryptosiphum* Buckton.

GENUS XEROPHILAPHIS Nevsky.

Acta Univ. Asiae Mediae, ser. viii-a, Zool. 3, p. 4 (1928).

Genotype.—*Xerophilaphis saxaulica* Nevsky.

This genus is not separable from *Pergandeidia* Schouteden, and if it is distinct from the latter, it must be a synonym of *Brachyunguis* Das. Some species of *Xerophilaphis* described by Nevsky are to be relegated to *Anuraphis* Del Guercio.

GENUS MINUTICORNICUS Knowlton.

Florida Entom., xii, p. 59 (1929).

Genotype.—*Minuticornicus gravidis* Knowlton.

Closely related to *Siphonotrophia* Swain, but differs in the 6-jointed antennae.

GENUS CACHRYPHORA Oestlund.

19th Rept. St. Ent. Minnesota, p. 132 (1922).

Genotype.—*Rhopalosiphum serotinae* Oestlund.

According to Oestlund this genus differs from *Rhopalosiphum* Koch in the cornicles swollen at the middle and at the tip, as well

as in having capitate hairs on the body. These characters seem to be specific and this genus may be a synonym of *Rhopalosiphum* Koch.

GENUS THARGELIA Oestlund.

19th Rept. St. Ent. Minnesota, p. 127 (1922).

Genotype.—*Aphis albipes* Oestlund.

Differs from the typical species of *Rhopalosiphum* Koch in the shorter cornicles somewhat constricted at the base.

GENUS NEAPHIS Nevsky.

Zool. Anz., lxxxii, p. 206 (1929).

Genotype.—*Neaphis viridis* Nevsky.

The type species is identical with *Rhopalosiphum lahorensis* Das, the genus sinking as a synonym of *Rhopalosiphum*. If this species represents a genus distinct from *Rhopalosiphum*, then *Stephensonia* Das has precedence over *Neaphis*. The antennae of the apterous form are sometimes 5-jointed.

GENUS CHAITAPHIS Nevsky.

Ent. Mitt., xvii, p. 197 (1928).

Genotype.—*Chaitaphis tenuicauda* Nevsky.

Resembles *Durocapillata* Knowlton of the subtribe *Macrosiphina*, but differs from it in lacking frontal tubercles, as well as in the long slender cauda destitute of capitate hairs.

GENUS EPAMEIBAPHIS Oestlund.

19th Rept. St. Ent. Minnesota, p. 132 (1922).

Genotype.—*Aphis frigidæ* Oestlund.

This genus is very peculiar in the following characters: Eyes distinctly protruding, lacking ocular tubercles. Cornicles long, slender, cylindrical, expanded at the apex. Body bearing many long capitate setae.

GENUS TRILOBAPHIS Theobald.

Ent. Mth. Mag., 3rd ser., viii, p. 137 (1922); Plant Lice Brit., I, p. 259 (1926).

Genotype.—*Trilobaphis caricis* Theobald.

This genus is a synonym of *Vesiculaphis* Del Guercio. The specific name *caricis*, as proposed by Theobald, was preoccupied by *caricis* Fullaway, and I will give a new name, viz: *Vesiculaphis theobaldi*, to Theobald's species.

V. theobaldi is different from *V. caricis* Fullaway in the more slender cornicles, as well as in the more distinct median process on the front.

GENUS HYDRONAPHIS Shinji.

Dobutsugaku Zasshi, xxxiv, p. 790 (1922).

Genotype.—*Hydronaphis impatiens* Shinji.

The description is too short, not including characters of prime importance, and I can not discuss this genus which will perhaps fall in this subtribe.

GENUS NEOLACHNAPHIS Shinji.

Dobutsugaku Zasshi, xxxvi, p. 353 (1924).

Genotype.—*Neolachnaphis itadori* Shinji.

The description is too brief to be considered.

GENUS SIPHONOCORYNE Shinji.

Dobutsugaku Zasshi, xxxiv, p. 793 (1922).

Genotype.—*Siphonocoryne polygoni* Shinji.

No description is given of the genus, with very brief notes on the species. This new generic name is perhaps a lapsus of Siphocoryne.

GENUS GEOKTAPIA Mordvilko.

Pucerons Gram., 1, p. 53 (1921); *Bull. Ent. Res.*, xiii, p. 30 (1922).

Genotype.—*Geoktapia areshensis* Mordvilko.

The keys of Mordvilko do not include characters of prime importance and this genus can not be considered.

GENUS ARESHA Mordvilko.

Pucerons Gram., 1, p. 54 (1921); *Bull. Ent. Res.*, xiii, p. 31 (1922).

Genotype.—*Aresha shelkovnikovi* Mordvilko.

This genus seems to run to *Cerosipha* Del Guercio in Baker's key.

(*Subtribe Macrosiphina.*)

GENUS TRITOGENAPHIS Oestlund.

19th Rept. St. Ent. Minnesota, p. 142 (1922).

Genotype.—*Aphis rudbeckiae* Fitch.

Oestlund separates this genus from *Macrosiphum* Pass. by the numerous scattered sensoria on the 3d antennal joint, but this

is a specific character in my opinion, and this genus must become a synonym of *Macrosiphum* Pass.

GENUS SITOBION Mordvilko.

Pucerons Gram., 1, p. 43 (1921); *Bull. Ent. Res.*, xiii, p. 26 (1922).

Genotype.—*Macrosiphum granarium* Kirby = *Sitobion avenae* Fab. of Mordvilko.

This genus is a synonym of *Macrosiphum* Pass. *Sitobium* Mordvilko (*Faune Russie*, i, 1, p. 65) is perhaps the same as this genus.

GENUS STATICOBIUM Mordvilko.

Faune Russie, i, 1, p. 66 (1914).

Genotype.—*Staticobium otolepidis* Nevsky.

No species of the genus has been mentioned by Mordvilko and I have designated Nevsky's species as type. This species is apparently a *Macrosiphum* with stout cornicles and a slightly constricted cauda, and the genus must sink as a synonym.

GENUS PACZOSKIA Mordvilko.

Faune Russie, i, 1, p. 63 (1914); *ibid.*, 2, p. 330 (1919).

Genotype.—*Paczoskia paczoskii* Mordv.

This genus is a synonym of *Macrosiphum*.

GENUS ANAMESON Mordvilko.

Faune Russie, i, 1, p. 63 (1914); *ibid.*, 2, p. 336 (1919).

Genotype.—*Anameson kamtschaticum* Mordv.

This genus is also a synonym of *Macrosiphum*.

GENUS METOPOLOPHIUM Mordvilko.

Faune Russie, i, 2, p. 270 (1919).

Genotype.—*Aphis dirhodum* Walk.

This genus is a synonym of *Macrosiphum*.

GENUS CATAMERGUS Oestlund.

19th Rept. St. Ent. Minnesota, p. 141 (1922).

Genotype.—*Nectarophora fulvae* Oestlund.

Differs from *Macrosiphoniella* Del Guercio in the longer, *Aphis*-like cauda. *Obtusicauda* Soliman is perhaps a synonym of this genus.

GENUS OBTUSICAUDA Soliman.

Univ. Calif. Publ. Ent., iv, p. 98 (1927).

Genotype.—*Obtusicauda essigi* Soliman.

This genus is perhaps a synonym of *Catamergus* Oestlund.

GENUS TITANOSIPHON Nevsky.

Ent. Mitt., xvii, p. 189 (1928).

Genotype.—*Titanosiphon bellicosum* Nevsky.

Closely allied to *Macrosiphum* Pass., differing, however, in the very long cornicles, which are about half length of the body and somewhat dilated on the apical portion. *Macrosiphum neoartemisiae* Takah. must be removed to this genus.

GENUS BIPERSONA Hottes.

Proc. Biol. Soc. Washington, xxxix, p. 115 (1926); Soliman, *Univ. Calif. Publ. Ent.*, iv, p. 96 (1927).

Genotype.—*Aphis torticauda* Gillette.

Related to *Macrosiphum* Pass., differing in the funnel-shaped cauda and the large, projecting, conical anal plate.

GENUS TUBEROSIPHUM Shinji.

Dobutsugaku Zasshi, xxxiv, p. 789 (1922).

Genotype.—*Tuberosiphum impatiens* Shinji.

T. impatiens and *T. camphorae* were described by Shinji. The descriptions are too brief, but the genus seems to be synonymous with *Megoura* Buckton, since *T. camphorae* is a synonym of *Megoura citricola* van der Goot.

GENUS CLAVOSIPHUM Shinji.

Dobutsugaku Zasshi, xxxiv, p. 790 (1922).

Genotype.—*Clavosiphum adenocaulis* Shinji.

This genus seems to be a synonym of *Amphorophora* Buckton.

GENUS EUCARAZZIA Del Guercio.

Redia, xiv, p. 135 (1921).

Genotype.—*Eucarazzia picta* Del Guercio.

As pointed out by Theobald this genus sinks as a synonym of *Rhopalosiphoninus* Baker.

GENUS ALPHITOAPHIS Hottes.

Proc. Biol. Soc. Washington, xxxix, p. 116 (1926).

Genotype.—*Aphis lonicericola* Williams.

This genus is provided with short, but distinct, frontal tubercles and I regard it as belonging to the subtribe Macrosiphina. Differs from *Trichosiphonaphis* Takahashi in the following characters: Frontal tubercles not protruding on the inner side. Cornicles without setae.

GENUS CRYPTOMYZUS Oestlund.

19th Rept. St. Ent. Minnesota, p. 139 (1922).

Genotype.—*Aphis ribis* L.

This genus is a synonym of *Capitophorus* van der Goot, the genotype belonging to it.

GENUS NEOMYZAPHIS Theobald.

Plant Lice Brit., i, p. 262 (1926).

Genotype.—*Aphis abietinus* Walk.

Differs from *Capitophorus* van der Goot in the less developed frontal tubercles as well as in lacking capitate setae, and from *Myzus* Pass. in the less developed frontal tubercles.

GENUS JACKSONIA Theobald.

Scot. Nat., 1923, p. 9 (1923), *Plant Lice Brit.*, i, p. 261 (1926).

Genotype.—*Jacksonia papillata* Theobald.

Closely related to *Myzus* Pass., but different in the cornicles sloping at the tip, with no flange, and in the frontal tubercles slightly projecting on the inner side.

GENUS MATSUMURAJA Schumacher.

Zool. Anz., liii, p. 187 (1921).

Genotype.—*Acanthaphis rubi* Mats.

As *Acanthaphis* proposed by Matsumura was preoccupied, this new name was given.

GENUS NEOPHORODON Takahashi.

Proc. Ent. Soc. Washington, xxiv, p. 204 (1922); *Aphididae of Formosa*, part 2, p. 16 (1923).

Genotype.—*Neophorodon rubi* Takah.

Differs from *Matsumuraja* Schumacher in lacking large dorsal tubercles and in the swollen cornicles.

GENUS TRICHOSIPHONAPHIS Takahashi.

Proc. Ent. Soc. Washington, xxiv, p. 205 (1922); *Aphididae of Formosa*, part 2, p. 19 (1923).

Genotype.—*Myzus polygoniformosanus* Takah.

Differs from *Myzus* Pass. in that the hind wings have only one oblique, and the cornicles are furnished with setae.

GENUS RHOPALOMYZUS Mordvilko.

Pucerons Gram., I, p. 45 (1921); *Bull. Ent. Res.*, xiii, p. 27 (1922).

Genotype.—*Rhopalosiphum poae* Gillette.

Differs from *Myzus* Pass. in that the front of head is strongly produced at the middle, and from *Francoa Del Guercio* in the shorter cauda and in the shape of the protuberance on the front.

GENUS MYZOTOXOPTERA Theobald.

Entom., lx, p. 31 (1927).

Genotype.—*Myzotoxoptera wimshurstae* Theob.

Differs from *Myzus* Pass. in the only once branched media on the front wings, and in the triangular cauda.

GENUS HAYHURSTIA Mordvilko (nec. Del Guercio).

Pucerons Gram., I, p. 45 (1921); *Bull. Ent. Res.*, xiii, p. 27 (1922).

Genotype.—*Hyalopterus dactylidis* Hayhurst.

The type species is apparently a *Hyalopteroides*, the genus sinking as a synonym.

GENUS NEANURAPHIS Nevsky.

Ent. Mitt., xvii, p. 192 (1928).

Genotype.—*Neanuraphis tarani* Nevsky.

Differs from any other genus of this subtribe in the very short rounded cauda.

GENUS DUROCAPILLATA Knowlton

Ann. Ent. Soc. Amer., xx, p. 229 (1927).

Genotype.—*Durocapillata utahensis* Knowl.

The frontal tubercles are very short, but distinct, and I list this genus in this subtribe.

GENUS DELPHINIOBIUM Mordvilko.

Faune Russie, i, 1, p. 65 (1914).

Genotype.—*Not indicated*.

No species of this genus has been mentioned. This genus was not listed in Baker's paper.

(*Subtribe Pentalonina.*)

GENUS PICTURAPHIS Blanchard.

Physis, vi, p. 43 (1922).

Genotype.—*Picturaphis vignaphilus* Blanch.

Differs from *Micromyzus* van der Goot in the hind wings reduced in size, lacking cubitus, and from *Idiopterus* Davis, in the venation, as well as in the somewhat swollen cornicles and the cauda somewhat constricted about the middle.

GENUS NEOAMPHOROPHORA Mason.

Proc. Ent. Soc. Washington, xxvi, p. 49 (1924).

Genotype.—*Neoamphorophora kalmiae* Mason.

Differs from *Microparsus* Patch in the swollen cornicles and in the presence of media on the hind wings.

SUBFAMILY ERIOSOMATINAE

TRIBE ERIOSOMATINI

GENUS COLOPHELLA Börner.

Abderhalden's Handb. biol. Arbeitsm., Abt. ix, Teil i-ii, p. 233 (1926).

Genotype.—*Tetraneura graminis* Monell.

According to Patch the wingless viviparous females of the type species have 6-jointed antennae, in this respect differing from the typical forms of *Tetraneura* Hartig in which those have usually 5-jointed antennae. But the antennal joints are variable in these forms and I regard this genus as a synonym of *Tetraneura*.

GENUS GEORGIAPHIS Maxson et Hottes.

Ent. News, xxxvii, p. 267 (1926).

Genotype.—*Georgia ulmi* Wilson.

As *Georgia*, proposed by Wilson, was preoccupied, this name was given.

TRIBE PEMPHIGINI.

GENUS GOOTIELLA Tullgren.

Centralanst. försök. jordbruk. Meddel., no. 280, p. 22 (1925).

Genotype.—*Gootiella tremulae* Tullgren.

Near to *Pachypappella* Baker.

GENUS TRUNCAPHIS Theobald

Entom., li, p. 25 (1918).

Genotype.—*Truncaphis newsteadi* Theob.

The apterous form has one-jointed tarsi, and is without cornicles.

TRIBE FORDINI.

GENUS ASIPHONELLA Theobald.

Bull. Soc. Royal Ent. Egypte, 1922, p. 76 (1923).

Genotype.—*Asiphonella dactylonii* Theob.

The eyes of the apterous form are very peculiar, being of 3 facets placed on a projection.

GENUS PEMPHIGETUM Mordvilko.

Bull. Soc. Zool. France, liii, p. 359 (1928).

Genotype.—*Pemphigetum muticae* Mordv.

This genus was regarded by Mordvilko as a synonym of *Geoica* Hart. in his later paper (*Compt. Rend. Acad. Sc. URSS., 1928, p. 526*).

GENUS HEMITRAMA Mordvilko.

Pucerons Gram., 1, p. 63 (1921); Bull. Ent. Res., xiii, p. 35 (1922); Schumacher, Deut. Ent. Zeits., 1923, p. 403 (1923).

Genotype.—*Hemitrama bykovi* Mordv.

This genus seems to be a synonym of *Forda* Heyden.

GENUS NEOSCHOUTEDENIA Schumacher.

Deut. Ent. Zeits., 1923, p. 403 (1923).

Schoutedenia Mordvilko, *Pucerons Gram., 1, pl 63 (1921); Bull. Ent. Res., xiii, p. 35 (1922).*

Genotype.—*Geoica cyperi* Schouteden.

The name proposed by Mordvilko was preoccupied by *Schoutedenia* Ruebsaamen and this new name was given by Schumacher to Mordvilko's genus. The original description of the type species is too brief.

TRIBE MELAPHIDINI.

GENUS SLAVUM Mordvilko.

Mem. Soc. Zool. France, xxviii, p. 74 (1927).

Genotype.—*Slavum lentiscoides* Mordvilko.

Near to *Aploneura* Pass.

GENUS FORMOSAPHIS Takahashi.

Aphididae of Formosa, part 4, p. 52 (1925).

Genotype.—*Formosaphis micheliae* Takah.

Differs from other genera in the reticulated sensoria on the antennae of the winged form.

SUBFAMILY HORMAPHIDINAE

TRIBE OREGMINI.

GENUS TRICHOREGMA Takahashi.

Trans. Nat. Hist. Soc. Formosa, xix, no. 102 (1929).

Genotype.—*Oregma bambusifoliae* Takah.

Closely related to *Oregma* Buckton, differing in that the cornicles are on elevated hairy cones.

GENUS DORAPHIS Hori et Matsumura.

Trans. Sapporo Nat. Hist. Soc., x, p. 112 (1929).

Genotype.—*Doraphis populi* Hori et Mats.

Near to *Cerataphis* Licht., but differs in the simple media of the front wings and in lacking cubitus on the hind wings. The antennae of the winged form are usually 4-jointed.

GENUS GISTELIELLA Strand.

Arb. aus Syst.—*Zool. Inst. Lettlaend. Univ.*, no. 27, p. 46 (1928).

Genotype.—?

Strand proposed this name for *Aphanus* Gistel (Faunus, i, p. 111, 1837), since Gistel's name was preoccupied by *Aphanus* de Laporte, 1832. Gistel's paper is not accessible to me and I can not consider this genus.

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No. 2

NOTES ON SYNONYMY OF DIPTERA, NO. 4.

By J. M. ALDRICH, U. S. National Museum.

The preceding number of this series was published in these Proceedings, Vol. 31, 1929, pp. 32-36.

1. *Trixoscelis*. When I published a note on this genus in the paper just mentioned I overlooked the disposition made of it by Tonnoir and Malloch, who placed it in the family Heleomyzidae in their paper on the family in Records of the Canterbury (New Zealand) Museum, Vol. 3, 1927, p. 83.

2. *Sturmia schizurae* Coquillett. In discussing this species and the name *Argyrophylax piperi* Townsend, in the same article, p. 36, I made a curious mistake in failing to notice that Townsend's reference of his own *schizurae* to *Argyrophylax* was equally erroneous with his reference of *schizurae* Coquillett to that genus. Instead of having one *schizurae* belonging to *Argyrophylax* and one to *Achaetoneura* (in which case *piperi* would be an unnecessary change of name), we have both belonging to *Achaetoneura*; so by the double error the name *piperi* is still necessary, but is in *Achaetoneura*, for Coquillett's species (Revision, 1897, p. 113).

3. *Ptychomyia selecta* Meigen. That this European species occurs in North America has now been ascertained. Townsend described the male as *Daeochaeta harveyi* in Trans. Amer. Ent. Soc., Vol. 19, 1892, p. 98; and the female as *Masicera tenthredinidarum* in the same volume of the journal, p. 285. I have recently examined the type of *harveyi*, and *tenthredinidarum* has been identified for many years as a common parasite of sawflies in the United States, although its type is not in existence unless it was returned to James Fletcher and deposited in the Canadian National Collection. Suspecting that the European *selecta* was the same, I sent several specimens from our material to Dr. J. Villeneuve, who confirmed the identity. *Selecta* has been reared from sawflies several times in Europe.

4. *Grisdalemyia bigelowi* Curran. (Canad. Ent., Vol. 58, June, 1926, p. 133.) My *Psiloneura flavisquama* (Proc. U. S. Nat. Mus., Vol. 69, art. 22, Dec. 1926, p. 23), is a synonym of this. As both species are genotypes, my genus is also a synonym of his.

5. In proposing the genus *Reedia* (Proc. U. S. Nat. Mus.,

Vol. 74, Art. 1, 1928, p. 17) I unfortunately overlooked the prior use of the name in Hymenoptera; I therefore now propose *EDWYNIA* as a new generic name in the place of my *Reedia*.

6. *Chiloepalpus aurifacies* Townsend (Ent. Mitteil., Vol. 16, 1927, p. 281) was identified in the National Museum by Dr. Townsend on his recent visit. I had previously identified the species as *Jurinia callipyga* Bigot (Annales Soc. Ent. France, 1857, p. 279, figs.), which is far from being a *Jurinia*,—in fact Bigot was very uncertain about the genus when he described it. On examining Bigot's types, through the kindness of Mr. J. E. Collin, I found my identification confirmed. Bigot's *Epalpus ochricornis* (Annales Soc. Ent. France, 1888, p. 95), also from Chile, is probably a synonym, differing only in having the antennae wholly red. I examined the single female type.

The genus *Edwynia* has many characters in common with *Chiloepalpus*, but has the propleura bare, the second abdominal segment with a marginal row of ten stout spines, and is in general a more robust and spiny form.

7. In commenting upon some of Enderlein's genera, I made the statement (Proc. Ent. Soc. Wash., Vol. 30, 1928, p. 143) that he had proposed the new genus *Euestelia* for *Rhinoessa coronata* Loew. All he said was, "Typus *E. coronata* (Lw. 1858)," the *E.* standing merely for the new genus. Professor Hendel informs me that the *coronata* Loew of 1858 is his European *Ochthiphila coronata*, the *Rhinoessa* dating from 1865. Thus I mistook the genotype, and the genus is not a synonym of *Pelomyia*.

In this connection I should add that Professor Hendel has more than half convinced me that his *Hypaspistomyia*, with *coquilletti* as type and including our *Desmometopa latipes* Meigen, is a valid genus; at any rate I was getting into deep water for me when I expressed my opinion that it probably was not, on the same page as the preceding.

8. While in Copenhagen last summer, I found the types of *Musca frigida* Fabricius in the collection of the Zoological Museum. There are two male types, and they are the same as *Coelopa gravis* Haliday, which is thus a synonym, just as Haliday thought in 1839. In my recent paper on *Coelopa* (Proc. U. S. Nat. Mus., Vol. 76, Art. 11, 1929, p. 3), I adopted the view that *frigida* is not a *Coelopa* at all and used *gravis* for our species of the New England coast; this change of name proves to be a mistake, and the species is *frigida*, as it has long been called.

9. *Belvosia recticornis* Macquart. In my paper on *Belvosia* (Proc. U. S. Nat. Mus., Vol. 73, Art. 8, 1928, p. 14), I have used this name for the species described later by Giglio-Tos as *bella*; specimens received from the Vienna Museum and connecting with Brauer's published statement about the Macquart type

seemed to make this disposition of *bella* necessary, unless I greatly misidentified it. On receiving my paper, Mr. Collin tried it on his specimens, and believed that I was in error here. He generously brought the types of Macquart with him to Washington in 1928, and I have reviewed the matter.

Macquart's *Gonia recticornis* was described without locality. He mentioned that the material was in M. Bigot's collection, now the property of Mr. Collin. Three specimens were received by me, one of which was headless and evidently a later specimen, as it is fresher and has not been in fluid, as Macquart stated that his specimens had been. Disregarding this one, the other two are male and female of one species, the former bearing Brauer's manuscript note, "Brauer, Wien, cvi (No. 94)." They run directly to *mexicana* Aldrich in my key; they also agree with my types, and I do not hesitate to sink *mexicana* as a synonym. This leaves *bella* Giglio-Tos as a valid species, which I erroneously called *recticornis* in my paper. All the bibliographical references are in my paper.

10. An overlooked work on South American Diptera. Edwyn C. Reed, a professor of natural history in the Naval School of Chile, published a catalogue of Diptera of Chile in 1888 (Catálogo de los Insectos Dípteros de Chile. Anales de la Universidad de Chile, Tomo LXXIII, pp. 271-316). The title is mentioned in Zoological Record for 1888, but the single new generic name is omitted and the entire list seems to have been overlooked by others as it has been by myself. It contains 716 numbered species of Chilean Diptera, well arranged and indexed. There is one new generic name, "Tana Reed," on p. 284, with the sole species "176 Paulseni (Lagarus) Ph. l. c., p. 729."

Inasmuch as *Lagarus* was used in Coleoptera thirty years before Philippi's paper, it is apparent that Reed is proposing Tana as a new name to replace it in Philippi's sense, although he does not explain the intention. So far I can, however, find no earlier use of *Tana* by him, and believe it should date from 1888.

11. *Mesembrinella purpurata* Aldrich (Proc. U. S. Nat. Mus., Vol. 62, Art. 11, 1922, p. 16) is a synonym of *M. nigrifrons* Bigot (described as *Ochromyia* in Annales Ent. Soc. France, 1878, p. 39, from Brazil). Mr. Collin very kindly sent me the Bigot types, two females, for examination.

Nigrifrons had previously been considered a synonym of *aeneiventris* Wiedemann, but proves to be distinct.

12. In the Canadian Entomologist, Vol. 23, 1891, p. 88, W. A. Snow described *Haematobia alcis*, a biting fly, collected the previous year by Professor L. L. Dyche on moose in northern Minnesota. Professor Dyche brought back only a small vial of specimens in alcohol. Snow mentioned the species again in the 22d Report of the Entomological Society of Ontario for

1891, p. 19; Dr. Hough published some notes on the types in Biol. Bull., Vol. 1, 1899, p. 22; Malloch in Annals and Magazine of Natural History, series 10, volume 2, 1928, p. 318, was inclined to believe Snow's species to be a synonym of the horn fly *Haematobia irritans* Linnaeus.

Recently Professor F. M. Gaige, of the University of Michigan, sent to the Museum 13 females of the species found attacking moose on Isle Royale, Michigan. This is the first discovery of *alcis* since Dyche collected it thirty-nine years ago. It is not only distinct from *irritans*, but belongs to the genus *Lyperosiops* Townsend, Proc. Ent. Soc. Wash., Vol. 14, 1912, p. 47. The genus was established without description by the designation of *Stomoxys stimulans* Meigen, a European species, as type.

The most striking character of this genus is the presence of distinct setules on the first longitudinal vein. *Alcis* differs but little from the type species of Europe and it may even prove identical when more material of both sexes is obtained. It is a remarkable fact that it has not yet been found, except attacking the moose.

13. In these Proceedings, Vol. 31, May, 1929, p. 91, I designated *Musca frit* Linnaeus as the type of the genus *Oscinella* Becker (Arch. Zool., Vol. 1, 1910, p. 150, where it is described as a new genus). Afterward I noticed that Enderlein (Zool. Anz., Vol. 42, 1913, p. 355) mentioned that *Oscinella* really dates from an earlier paper. On looking this up I find that Becker (Bull. Mus. d'Hist. Nat. Paris, 1909, p. 120) described a species from British East Africa as "*Oscinella deficiens* nov. sp. (*Oscinis olim*).". This having appeared earlier than the description as a new genus, evidently fixes the type as *deficiens*, not seen by me, and apparently a somewhat peculiar species.

THREE NEW GALL-FLIES FROM ARIZONA (HYMENOPTERA: CYNIPIDAE).

BY LEWIS H. WELD, East Falls Church, Va.

While camping for two winters at Camp Creek (nearest post-office Cave Creek, Ariz.), fifty miles north of Phoenix, Mrs. Nettie Weld Capron sent me galls which she collected on various occasions from the only oak which grows in that vicinity and which seems to be *Quercus subturbinella* Trelease. Not all of the forty-four kinds of galls sent could be reared, but of those from which adults were obtained the three following are described as new. For the convenience of fellow students in the group paratypes are deposited in three widely separated museums so that they may be consulted without too extensive travel.

***Diplolepis capronae*, new species.**

Female.—Red. Head from above transverse, narrower than thorax, cheeks prominent but not broadened behind the eyes, occiput slightly concave; from in front broader than high, facial quadrangle 1.3 times as broad as high, malar space .4 eye without groove, antennae filiform, 14-segmented, lengths as (scape) 18 (9): 6: 25 (5): 21: 17: 14: 11: 9: 8: 7 (6): 6: 5.5: 5: 8 (5). Sides of pronotum punctured and pubescent. Mesopleura pubescent. Mesoscutum shiny, with scattered punctures bearing silvery hairs, parapsidal grooves deep, smooth and percurrent, no median, broad lateral line areas bare and smooth. Two large pits at base of the scutellum opening out on to disk behind and separated by a narrow but prominent median carina. Disk rugose, coarser posteriorly, margined on sides. Carinae on propodeum narrow, slightly curved, enclosed area widest above. Tarsal claws with tooth. Wing hyaline, pubescent, ciliate, the type with a small round spot in radial cell, a cloud back of it in base of third cubital and a group of confluent markings near apex. These spots are absent in some of the paratypes cut from the galls in November. The basal and first abscissa of radius are clouded and the second abscissa is bent upward and thickened toward tip which does not reach the margin. Areolet reaches one-fifth way to basal. Abdomen longer than head and thorax, length to height to width as 35: 29: 21; lengths of tergites along dorsal curvature as 29: 4: 2, their hind margins oblique, the rest hidden, abdomen reaching a little beyond areolet. Ventral spine stout, bristly, triangular in outline in ventral and side view. Using width of head as a base the length of mesonotum ratio is 1.5, antenna 2.1, ovipositor 2.1, wing 4.1. Length 3.0–3.35 mm. Average of six specimens 3.15 mm.

Its red coloration, less distinct spotting of wings, rugose scutellum with more distinct pits will distinguish it from the related *Diplolepis bella* (Basset) which also occurs in the same locality and on same host.

Type.—Cat. No. 42884, U. S. Nat. Mus. Type. Paratypes (antennae broken) in Field, Stanford and American Museums.

Host.—*Quercus subturbinella* Trelease.

Gall.—Globular, 8 to 18 mm. in diameter, attached to midrib or strong vein on under side of leaf. Its straw-yellow color with vertical purple streaks makes it a beautiful object when fresh. The outer shell is about half a millimeter thick and crinkly radiating fibers support a central larval cell.

Habitat.—The type locality is Camp Creek, Arizona, where Mrs. Capron, for whom the species is named, collected galls on five different occasions in November and December, 1927 and 1928. Unfortunately most of the adults had emerged and the type material consists of flies which were dead when cut out of the galls.

***Andricus scutella*, new species.**

Female.—Reddish brown, base of abdomen and of scutellum lighter. Head as broad as thorax, coriaceous, cheeks scarcely broadened behind the eyes,

outline from in front almost circular, interocular space broader than high, malar space one-third eye without groove; antennae 13-segmented, lengths as (scape) 9: 6: 11: 9: 8: 7: 6: 6: 5.5: 5: 5: 4.5: 10. Mesoscutum longer than broad, coriaceous under high power, shining, with scattered setigerous punctures, parapsidal grooves narrow, deep, percurrent, a slight trace of a median behind, lateral lines smooth, shining. Scutellum with two small smooth pits, disk alutaceous, margined on sides. Carinae on propodeum angled. Mesopleura smooth, polished. Wing pubescent, ciliate, veins yellowish-brown, second abscissa of radius arcuate, radial cell five times as long as broad, areolet reaching one-tenth and cubitus two-thirds way to basal. Claws with a tooth. Abdomen shining, length to height to width as 21: 18: 9, lengths of tergites along dorsal curvature as 55: 15: 2: 2: 2: 6, second tergite with pubescent patches at base, its hind margin at angle of 45° to long axis. Ventral spine slender, in side view seven times as long as broad. Using width of head as a base the length of mesonotum ratio is 1.4, antenna 2.8, ovipositor 3.7, wing, 5.1. Length 1.6-2.15 mm. Average of 55 pinned specimens 1.78 mm.

Distinguished from *Andricus parmula* Bassett, which forms a similar but shallower gall on several species of oak in California, by its lighter color, shorter abdomen, and its more shining and nearly bare mesoscutum.

Type.—Cat. No. 42885, U. S. Nat. Mus. Type and 9 paratypes. Paratypes in American Museum, Field and Stanford.

Host.—*Quercus subturbinella* Trelease.

Gall.—A cup-shaped spangle up to 4.5 mm. in diameter and 3.5 mm. high, brown with a whitish bloom, attached to under side of leaf. The edge of the cup is thin, not in-rolled, often collapsed. The larval cell 2 mm. long by .7 mm. in diameter is placed transversely in very base of cup. The exit hole is into the bottom of cup. The gall resembles that of *Trigonaspis cupella* Weld on the same host, but lacks the in-rolled margin and dark color of that species and the adult is fully winged.

Habitat.—The type locality is Camp Creek, Arizona, where Mrs. Capron collected some on January 21, 1928. Some adults had already emerged and others were cut out of the galls on February 4. More galls were sent from the same locality on November 20 and December 8, 1928, and living flies cut out December 14 and January 3, 1929.

***Xanthoteras mediocre*, new species.**

Female.—Head piceous, thorax and abdomen black; from above massive, length to width as 25: 44, wider than thorax, occiput concave; cheeks ample but not broadened behind the eyes; from in front as broad as high, interocular space .7, transfacial and area 1.75 times as broad as high, malar space .6 eye with groove; antennae 14-segmented, lengths as (scape) 11: 7: 11 (5): 7 (5): 7: 6: 5: 4.5: 4.5: 5: 5 (5): 5: 5: 8. Sides of pronotum with setigerous punctures. Mesoscutum smooth, shining, a few punctures along the deep percurrent parapsidal grooves.

Scutellum tapering suddenly to a blunt point behind, not gradually as in *Acraspis*, transverse groove at base but indistinctly subdivided, disk shining with a few scattered punctures. Carinae on propodeum angled. Mesopleura bare, shining. Wing rudimentary, reaching about to hind margin of tergite III, veins brown, no areolet. Tarsal claws with a tooth. Abdomen as long as head and thorax, higher than long, lengths of tergites along dorsal margin as 14: 4: 3: 2: 2: 4, ventral valves oblique, ventral spine tapering, in side view stout, three times as long as broad, with scattered bristles. Using the width of the head as a base the length of mesonotum ratio is 1.06, antenna 2.4, ovipositor 3.0, wing 1.3-1.6. Length 1.4-2.2 mm. Average of 104 specimens 1.93 mm.

Type.—Cat. No. 42886, U. S. N. M. Type and 19 paratypes. Paratypes in American Museum, Field and Stanford.

Host.—*Quercus subturbinella* Trelease.

Gall.—Similar in color and structure to the gall of *Xantho-teras forticorne* (Walsh) but not so large. The clusters are roughly globular, about 20 mm. in diameter, on young shoots under débris. The individual fig-shaped galls contain from 2-6 cells, while those of *forticorne* are monothalamous.

Habitat.—The type material is from Camp Creek, Arizona. Mrs. Capron sent galls on November 20, 1928, and living flies were cut out on December 8. On December 27, 1928, she collected another lot of galls and flies were cut out January 2 and others emerged indoors about January 22, 1929.

THE CYCLES AND HABITS OF PHLYCTAENIA TERTIALIS (GUENEE) (LEPIDOPTERA, PYRALIDAE).

BY W. V. BALDUF¹

Phlyctaenia tertialis (Guenee) (*plectilis* G. and R., *syringicola* Pack.) has received scant consideration in the literature of insects. It is a widespread species, being reported by Chittenden (1) from Maine, New Hampshire, Massachusetts, New York, New Jersey, Virginia, Ohio, Illinois, and Kansas. But it rarely has attacked cultivated crops. Chittenden records it from Virginia on grape, whose leaves "they fold together near the middle and join with their scanty web." But this attack was believed to be secondary, the larva having been found later "in greater abundance upon a cultivated ornamental plant of the genus *Sambucus*, called flowering elderberry," from which it perhaps spread to the grape. Englehardt (2) bred it from "dead and dry shoots of elderberry" and the writer watched it from October to October of 1927-28 at Urbana, Illinois, and at

¹Contribution No. 131 from the Entomological Laboratories of the University of Illinois.

Oak Harbor, Ohio, during the summer of 1928, obtaining it always from *Sambucus*. Some of its habits are similar to those of its notorious relative, *P. rubigalis* (Guenee), the greenhouse, or celery, leaf tyer, and therefore it may appropriately be known by the common name elder leaf tyer.

DESCRIPTION OF THE STAGES.

The Egg.—Length 0.78 mm., width 0.60 mm., whitish, shiny; oval in outline, ends broadly rounded, moderately and quite uniformly convex; surface sculpture consisting of minute quadrate to subquadrate areas, sometimes pentagonal, rarely hexagonal or subcircular; placed in masses of various numbers from 1 to 16 and irregular shape, latter determined by the presence on the leaf of strong cilia which the moth apparently avoids in ovipositing. The distribution of the cilia is not uniform, and the clear spaces of the leaf are selected, with the result that the moth moves hither and yon, as shown by the positions of the egg masses.

The Larva.—Larvae believed to be of the second instar were slender, whitish to pale or medium green, and 7 to 9 mm. long. Individuals about three-fourths grown have a broad light-colored longitudinal stripe on each side of the dorso-median line, and resemble the more advanced greenhouse leaf tyer. The condition of maturity of the elder leaf tyer may be known by the change in color from green to a conspicuous deep pink which later fades to pinkish-white to dull white when the insect is in the pre-pupa stage or in hibernation.

The head of the mature larva is medium brown and the ana tergite is not heavily chitinized: length 20 to 22 mm., width about 2.5 mm., tapering more caudad than cephalad. Only the prothorax bears a pair of spiracles, which are positively on the propleura, distinctly subovate, and larger than those on abdominal segments one to seven, and about the size of the pair on segment eight. The body is sparsely clothed with short and longer stiff hairs, which are arranged essentially as follows: four long on each side of the head, of which two form a transverse row mesad of the eyes, and one below and one in front of the eyes; thoracic segments with two transverse rows dorsad between spiracles, anterior row larger, the two rows converging on meso- and metanota; propleuron with a pair borne on a fleshy tubercle above base of legs, and a pair (dorsal member smaller) anterior to spiracle: on the meso- and metapleura there is a single, larger hair above bases of legs, and a smaller hair occupies places corresponding to the position of the prothoracic spiracle: the nota of the abdominal segments bear four hairs each, forming a subquadrate figure; on the pleura are a single hair above the spiracle, and a smaller pair below the spiracle; on the antero-lateral side of the base of the prolegs is a curved row of three about as long as the prolegs themselves; this set of three assumes the position of the prolegs on segments one, two and seven. One prominent hair is intermediate between the above sets of three and the subspiracular hairs.

The Pupa.—The pupa is medium brown, which turns to deep brown in individuals about to yield moths. Length 10-11 mm., maximum width 2 mm. or slightly more. The form is typically lepidopterous, the surface glabrous and bare excepting a few short hairs above and below the abdominal spiracles and

a group of eight spine-like hairs on the black protuberance at the tip of the abdomen.

The Moth.—The adult is slightly larger and more robust than *P. rubigalis*. The expanse of the front wings varies from 15 to 21 mm., that of the hind from 13 to 16 mm. In color they are predominantly moderate brown with varying amounts of yellowish-brown. Usually the front wings have three patches of the latter color, one mid-way on the anterior margin, another subterminal on that margin, and the third behind the latter. The hind wings bear two, more elongate, patches of irregular form on the median third, the two overlapping along the middle. A narrow zig-zag curved band of the same color borders these patches on the distal edge on the apical fourth of both wings.

HIBERNATION AND SPRING APPEARANCE.

The fall and winter period of inactivity is spent in the final larval instar. The earliest larva found entering hibernation was taken on July 26 (Urbana), and many had occupied the typical wintering places on August 22 (Oak Harbor). All of these were still in this condition on November 1, 1928. Reared larvae from the latest spring generation moths at Oak Harbor were still in the second and third instars on August 22, hence, some larvae are not mature and presumably do not begin to hibernate before the first half of September. When the species was observed quite extensively on October 29, 1927 (Urbana), all individuals were larvae in hibernation. Wintering therefore begins in late summer, and continues to late April and early May (Urbana) of the next year.

The larva, upon reaching maturity from feeding on the elder leaves, goes groundward in search of elder or weed stems in which it forms a hibernaculum. Such stems are sometimes few and scattered, and then considerable crawling is obviously necessary to find suitable shelter. Climbing up a standing stump two feet high to enter the broken end was also observed to have taken place. Along the Big 4 railroad (Urbana), the elder had been mowed down before the time for entering hibernation, and the larvae were common in the pith of the stumps or of the parts cut off and lying on the ground. Where growth is not disturbed, the larvae were found in the stumps and stems of elder broken by natural agencies. Wintering larvae were also commonly taken in old stems of large weeds, probably goldenrod and ragweed, lying broken on the soil. Some stems selected were still solid with pith, others were hollowed by age. When the stem is filled with pith, the larva mines in from the cut or broken end to varying distances, but not farther than three inches, and usually within the first one or two inches from the end of the stem. Frequently the outer end of the cocoon closes the outer end of the burrow. If a hollow stem is occupied, the larva may enter it a foot or more, or lesser distances, to construct its shelter.

The hibernaculum is a structure of whitish silk and about five-eighths inch long, and often mixed with more or less of pith particles formed when the larva mines into the stem. In large hollow stems these are fastened to the inner wall of the cavity, and have rather oblique ends, while in smaller stems the tunnel may be completely obstructed by the construction, the ends of which are flat and placed obliquely across the cavity, as above in solid pith stems. Instances were observed in which as many as five hibernacula were made in a series in single stems. Sometimes, especially in old hollow stems, one larva may construct as many as four oblique silk walls across the tunnel between its hibernaculum and the outer entrance, all parallel with one another and about one-fourth or one-eighth inch apart. Not uncommonly, larvae and chrysalids were seen in cocoons made in the empty chrysalids of *Achatodes zaeae*, the elder stem borer.

Larvae collected October 29 (Urbana) transformed to moths in the laboratory between December 15 and March 21. On May 10, 1928, 40 larvae and 83 pupae were removed from hibernacula in nature, whereas on May 12, 47 larvae and 36 pupae were taken. Some of them had pupated several days before,—their color was a deeper brown than that of newly transformed individuals. From these records it is known that pupation began about the first week of May, when new elder growth was less than six inches high. On May 24, new elder was one to two feet high. In thin sunny stands of the food plant, most *P. tertialis* had pupated, but in a denser growth under shade trees more than half were still larvae, on May 30.

The earliest freshly empty chrysalids were seen on May 12, and moths issued in cages during the rest of that month, and emergence of the adult obviously continues into the middle of June, in as much as some larvae persisted to at least May 30. On June 10 (Urbana) elder had grown to three feet or more in height, and moths flew commonly from place to place among the elder clumps when disturbed, and were most numerous in the denser bushes. They come to rest quickly on the under sides of leaves after a short darting flight. At this time no conspicuous feeding injury was noticeable on the foliage, and larvae were not found. Moths reared in the laboratory on May 24 and 25 deposited eggs in an indoor cage on May 26, and the first generation was well started on June 11 when the writer went to Oak Harbor, Ohio, for the summer. Materials sent him at intervals during that time by Dr. A. E. Miller made it possible to follow developments of the Urbana moths in a general way.

THE FIRST GENERATION.

During the week following June 21, no larvae in hibernacula or on leaves were seen, but both empty and entire chrysalids, and also moths in flight among elder, were rather general at Oak Harbor and Reno, Ohio. Hence, development here was probably only a week or two behind that at Urbana. Moths reared from chrysalids collected in the above time were among the last to issue from the hibernacula. The progeny of these moths was observed throughout the season in laboratory cages, and supplementary studies were made of out-of-doors Oak Harbor material in addition to that from Urbana.

Several masses of eggs were deposited by these late moths on or before July 3. The larvae hatched between July 5 and 9. On July 19 they had made their first moult. All instars are very active when disturbed, and wriggle to the leaf edges and spin down, later regaining the leaves by ascending the silk line. They fed upon the leaves of elder, chiefly on the lower surfaces, and webbed them together quite flatly,—did not curl or roll them. Even at this age some had chewed holes entirely through the leaves. On July 17, the larger larvae had reached a length of 14 to 20 mm., and were still relatively slender, and whitish to pale green. Their method of attack was still to web adjacent leaves together and to eat the tissues while hiding within the silk coverings and foliage. But there was also a considerable amount of leaf-rolling by these larger individuals. This form of injury was common, too, in nature. They feed voraciously when almost mature. Large larvae were reported abundant at Urbana on July 18. On July 19, several reared Oak Harbor larvae had turned mature pink, and made cocoons in the corners of the cage, especially on the floor, but only a few between the tied leaves or leaf remains, the latter situations probably being selected due to cage conditions. All had become mature and most were pupae on July 29. A number of pink larvae placed in a large outdoor cage containing a growing elder, and otherwise constructed to simulate the favored habitat, were later found to have tied some leaves together, but made burrows and cocoons only in the dead, dry stems on the ground. Later, corrugated cardboard was found suitable for pupation in the cages. Thereafter, mature larvae and chrysalids were always found in such pithy or hollow stems, under natural conditions, on or near the ground as were occupied by the same stages of the overwintering generation. It is of interest in this connection, to recall that in the case of the greenhouse leaf tyer (3), "pupation takes place in folded leaves," except when the leaves are "badly skeletonized." This difference in habit is probably significant ecologically. In all other essential respects, the ways of these two species are alike.

Within a few days the pink larva becomes shorter and pale white. New pupae were obtained from the field at both Urbana and Oak Harbor on July 23, but larvae of all sizes occurred on the leaves, hence the generations seem to overlap considerably. The smaller ones were early individuals of the second generation because those reared in the laboratory were from the last moths to emerge, and these laboratory larvae were almost mature at this time. The first cycle, from mature wintered larvae to the next appearance of mature larvae, occurred from the first half of June to latter July at Oak Harbor.

THE SECOND GENERATION.

The pupa stage in the heat of summer is 11 to 12 days, but others required 14 days to transform. The first reared moths of this generation issued on or about August 6, and these being late comers, the earliest probably emerged in mid-July. Issuance of moths from material reared entirely in cages continued to August 20. An adult on wing was seen about elder in nature on August 22, and on the same day several live pupae from out-of-doors were still to yield adults. One late adult issued from Urbana material on August 29. The time required for the species to pass through one cycle, from adult to adult, in the summer generation, was about five weeks.

Oviposition by late reared moths of the first generation took place in the cages about August 10, but egg laying began before July 30 and continued to the first or second week of September out-of-doors, according to general evidence. On August 20, numerous larvae in the second instar were on the leaves in the cages. These reached full size and constructed their hibernacula between August 31 and September 15, and on November 1 were still in the larval state. Larvae from moths seen on August 22 and from other adults issuing about August 30, would not mature until late in September. The first of the second generation to reach the pink stage (Urbana) were taken on July 26. The first mature Oak Harbor larvae were found on August 22, but earlier individuals no doubt occurred. Many hibernating larvae therefore existed in this state during a month or more of warm weather when green elder foliage is still on the plants.

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NOTES ON THE CAÑAFISTULA WEEVILS OF THE GENUS
PHELOMERUS PIC (COLEOPTERA: MYLABRIDAE).

By WILLIAM DWIGHT PIERCE, Ph. D.

Among the interesting insects intercepted by the Federal Horticultural Board, E. R. Sasser found specimens of a "bruchid" weevil attacking the beans of the Cañafistula (*Cassia fistula*). As the species has not been studied morphologically, the following notes and descriptions will serve to identify the two species.

The interesting photographs of beans from "F. H. B. 23957" lot, illustrate an infested bean, one with adult emerging, one broken to show pupa, and another to show larva (Plate I).

Phelomerus Pic.

Phelomerus Pic, 1912, L'Echange Linneene, Vol 28, p. 92.

Type, hereby designated, *ochropygus* Pic.

Also included (*distinctus* Pic) = *aberrans* Sharp.

In addition to the two originally included species and the synonymy suggested above, Pic in 1913 added *Pachymerus lineola* Chevrolat (1871).

It is of great interest to note that the two original species breed in the seed pods of the huge podded Cassias, known as cañafistula, *Cassia fistula*, and *C. grandis*. This is quite in harmony with the author's findings of a correlation between habit and classification.

Pic's original description of the genus and also of the first two included species was very brief and inadequate. A translation follows:

Phelomerus, near *Pachymerus* Latreille. Form relatively elongate, posterior femora long, greatly surpassing the other femora, flattened and multidentate beneath. Head long, carinate; antennae with last joints very transverse. Genus established for the two following species from Colombia: *ochropygus* (Jekel), black, clad with a fulvous pubescence above and white beneath and on the pygidium, the latter bordered with black at base; front of head, greater part of antennae and four anterior legs more or less testaceous; prothorax unequal above, long, very constricted in front, with posterior angles very salient; and *distinctus* (Jekel), of a form a little less elongate and moderate size, with bands or spots of variable pubescence above, partly glabrous beneath

and on the posterior legs; pygidium black, in greater part glabrous, ornate with a pubescent white spot, more or less large, toward the apex, and maculate with yellowish brown at base.

Although these descriptions are very brief, I believe that the two species discussed below are properly identified:

***Phelomerus ochropygus* Pic.**

Phelomerus ochropygus Pic, 1912, L'Echange Linneenne, Vol 28, p. 92.

Described below from two specimens bred from beans of cañafistula (*Cassia grandis*) (det. H. C. Skeels) from Panama and taken in quarantine at Washington, D. C., by E. R. Sasscer, March 18, 1918, under F. H. B. No. 23957.

This large beautiful beetle (fig. 1) measures when fresh and fully extended, 9 mm. in length and 4 mm. in breadth. It can probably draw in its abdomen enough to reduce its length from one to two mm. It is in general brownish testaceous with conspicuous white pubescence on the venter and pygidium.

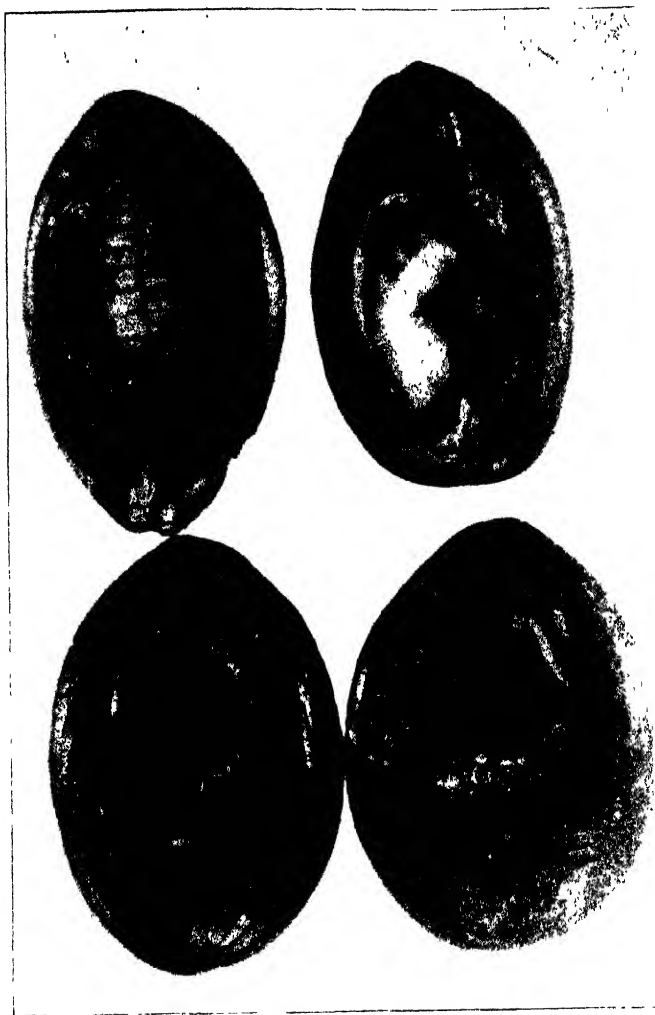
I shall proceed to a rather detailed description of this insect in order to introduce a more modern morphological description of a species of this family. In the past we have dealt



Figure 1. Adult *Phelomerus ochropygus* Pic, from side.
Drawn by H. S. Bradford.

with more or less vague terminology in Coleopterous descriptions, paying no respect to the value of morphological studies. Descriptions need not necessarily be long, but it is at least essential that one species in a genus be fully described.

The head is elongate, but hardly to be described as rhynchophorous. It is as long in front of the anterior margin of the eyes as behind it. The posterior portion of the head, or *collum*, which telescopes within the prothorax, is separated from the epicranium proper by a slight transverse constriction. This part is often called the neck. The dorsal portion of the collum, or occiput, is very minutely transversely rugulose and clothed with fine, golden brown pubescence. In front of the collum, between the eyes is the *epicranium*, medianly divided by the *epicranial suture*, in the form of a ridge. The epi-



EXPLANATION OF ILLUSTRATION.

Plate I. Photograph of four castafistula beans, infested with *Phlomeus ochropygus* Pic, showing larva, pupa and adult (photo by E. A. Sasscer).

cranium is separated behind from the pregena by a distinct suture from the base of the eye to the collum, and in front by a ridge over the antennal scrobes, from the dorsal edge of the emargination of the eye to the frontal suture, near the articulation of the mandible. The epicranium anteriorly is defined by the *frontal sutures* which branch forward from the epicranial suture. Along side of eyes the *vertex* portion of epicranium is very distinctly grooved. The surface of epicranium is finely punctate, densely pubescent with golden decumbent hairs, and with a row of sparse, long and close, short, erect superciliary hairs. The epicranium is laterally strongly emarginate by the inner lobes of the eyes.

The *eyes* are large, multiple-faceted, deeply emarginate, the inner lobe being narrower. The *frontal sutures* diverge from the epicranial suture, forming a very obtuse angle with the apex opposite the antennal fossae. They cut laterally the ridge from mandible to eye above the antennae, and terminate opposite the attachment of the mandibles. In front of these sutures is a large pentagonal piece, of which the black basal triangle is densely pubescent and the apical trapezoid very sparsely pubescent and reddish yellow in color. The lateral angles of the trapezoid are pedunculate. These two areas, triangle and trapezoid, represent the *frons*, and the *clypeus*; separated by the *epistoma*, which, however, is merely indicated by the change of vestiture. The epistoma probably meets the frontal sutures at the supra-antennal ridge, which is incidentally the suture between epicranium and *gena*. In front of clypeus is the black, broadly transverse, semilunar *labrum*, which bears a row of long discal hairs and also a fringe of apical pubescence. The *pregena* is well defined. Posteriorly it is separated from collum by the basal

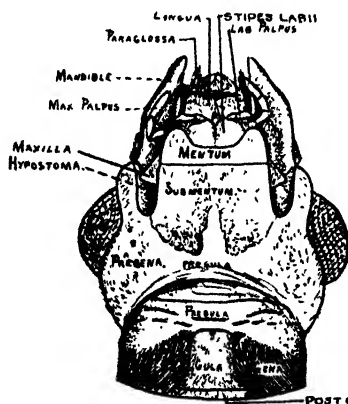


Figure 2. Venter of head of *P. ochropygus*. Drawn by W. D. Pierce.

constriction; dorsally it is bounded by a suture separating it from epicranium, and by the inferior lobe of the eye; anteriorly it invades the eyes, and is bounded by the supra-antennal ridge, the epistoma-frontal suture, and pleurostomal margin of the mandibles, and bears the antennae in front of the emargination

of the eyes. Ventrally (fig. 2), it is bounded by hypostoma and the basal lobe of the submentum; but is separated from pregula only by a change of vestiture. Throughout, the pregena is clad with long golden or white hairs, which become very sparse near the pregula, and very dense in the emargination of the eye. The pleurostomal margin of the pregena is emarginate.

The antennae are borne on a ball socket, with the first joint, or scape, slightly broader than the following, but little longer than broad, the funicular joints are three in number; the fifth joint is triangulately enlarged, the sixth to eleventh laterally produced, eleventh acute at outer apical angle, these seven joints constituting a broad, flattened club.

The *hypostoma* is a narrow glabrous piece, clearly separated from the pregena, but basally inseparable from the submentum, except by its absence of vestiture.

Hidden by the prothorax and only visible when the head is removed, we find the pregular area extending back of the constriction to the tongue-shaped *gula* and the genae at its sides. The base of the gula is the *postgula*. The gula forms the sternum, the genae the pleuri, and occiput the tergum of the collum.

The *pregula* is the ventral piece cut by the constriction of the collum. It is glabrous, but otherwise not separable from pregena or submentum. This glabrous pregular area is broad at base and projects forward between two pubescent lobes of the submentum with an acute apex, and two acute lateral processes into the area of the submentum.

The large quadrate *submentum* is, as just mentioned, divided basally into two lobes by the pregular area. The lateral processes of the pregula separate off a basal depressed, pubescent area on each lobe. The anterior portions are pubescent, merely adjoining the mentum. The *mentum* is a clearly defined subquadrate transverse piece, with broad, rounded lobes extending forward on each side of the labium. It bears a small clump of white hairs at each side. *Stipes* labii is broad, quadrate at base; the *palpi* three-jointed with basal joint small, second twice as long, enlarged at apex, third a little longer, the two latter black, the basal joint brownish; anterior lobes yellow, strongly fringed. The *maxillae* lie in a deep groove formed by the mandibles and hypostoma below, and the submentum, mentum and labium above. The palpi are four-jointed, the basal joint small and brown, the other three long and black. The mandibles are interesting in that their edges are shining glabrous, rounded, and the pleural face is depressed and densely pubescent; the apices are bluntly pointed.

The prothorax is about twice as wide at base as apex and with the posterior angles acute. The median dorsal line is depressed. There is a lobe on each side at base near the posterior angles. The base is broadly truncate lobate. The dorsal surface is densely clothed with golden brown decumbent pubescence. There are no distinct sclerites on the prothorax. The sternum is acutely angulately produced between the coxae, but does not completely separate them. The coxal cavities are open behind. Coxae elongate, contiguous at apex; trochanters minute; femora moderately slender, slightly enlarged beyond middle; tibiae slender; tarsi five-jointed with first longest,

second broader at apex, third broadly bilobed, fourth minute in base of emargination of third, fifth elongate, with claws appendiculate-toothed at base.

The vestiture of the prothorax beneath, and of the legs to the middle of tibiae is densely white, decumbent; the apical half of the tibiae beneath is clad with brown hairs, otherwise the tibiae and tarsi are clad with white; tarsal pods spongy beneath.

The scutellum is minute, medianly sulcate. The elytra are short, broadly, separately rounded at apex, emarginate by the prothoracic lobe; basal margin irregularly elevated; ten-striate; the first four striae strongly marked by elongate slash-like punctures, the others less distinct; lateral interspaces transversely slashed; vestiture dense, golden brown with lighter streaks.

The mesosternum and legs are densely white pubescent. The mesoepisternum only reaches the elytra externally. The mesosternum extends back, completely separating the coxae by about two-thirds their breadth. The coxae are more oval in shape, compressed, roundly grooved for the femora. Otherwise this pair of legs is like the preceding. A narrow transverse sternellum closes the coxae behind.

The metasternum is also completely clad with white beneath. The metepisternum is almost completely covered by the elytra. The epimeron is a broad quadrate piece. The metasternum is tumid in front, but not perpendicular. There is a median sternal suture, and at base there is an emargination caused by a small acute process of the abdominal intercoxal piece. There is a transverse trochantin in front of the transverse coxae, which are broadly separated by the broad intercoxal process of the abdomen.

The posterior legs have a transverse coxa, a small acute trochanter, a huge inflated femur; an arcuate, ribbed, acutely pointed tibiae, and normal tarsus. The femora are grooved beneath for reception of the tibiae and bear an external row of about eleven denticles, and an internal row of five or more slightly larger teeth guarding the groove. The hind femora are rather roughly granulate toward apex.

The abdomen is dorsally clothed with dark brownish pubescence, except that the apical half of the pygidium is densely clothed with white, which extends forward in three points. Each abdominal segment, except the last, consists of a tergal plate with the areas merely indicated by faint pubescences; a small tergal spiracle-bearing plate, with oval annular spiracles; a small epipleurum, a small hypopleurum, and the sternum divided transversely into basisternum and sternellum. The basisternal plates are glabrous; the sternellar plates are densely white pubescent, except at the sides of the second and third segments. The pubescence on the fifth ventral is more silvery, but there is a dense white patch toward the side. The pygidium in the male is clothed with white almost to the base. When the abdomen is contracted, the basisternal plates are concealed.

Larva.—This is illustrated by figures 3, 4 and 5. Frons bearing three pairs of setae, one pair discal, one pair lateral, and one pair latero-anterior. Antennae rudimentary two-jointed. Labrum broadly rounded. Mandibles obtuse, with a single seta. Maxillae with two-jointed rudimentary palpi. Labial palpi merely indicated.

The thoracic segments are made up as follows: three dorsal sclerites—

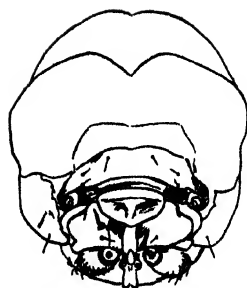


Figure 5. Face of larva.

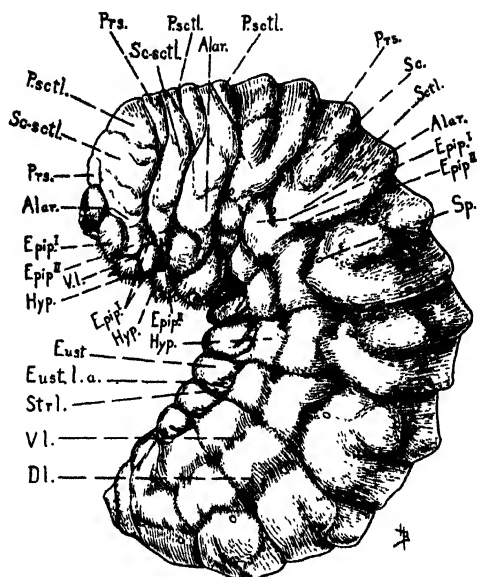
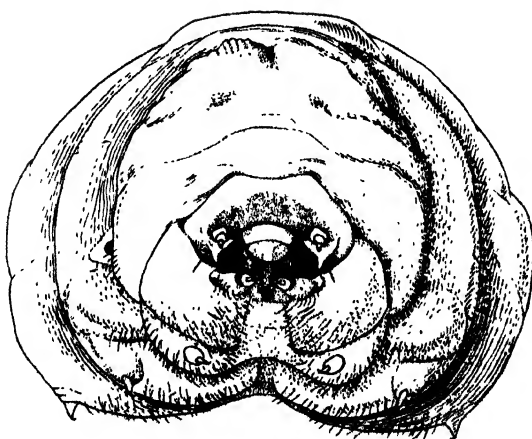
Figure 3. Larva of *P. ochropygus*.

Figure 4. Front view of head and thorax of larva.

prescutum, scuto-scutellum and postscutellum, the first and last being spindle-shaped, while the scuto-scutellum extends from alar area to alar area. The alar area, fused with the second part of epipleurum is not strongly differentiated from the scuto-scutellum. The anterior part of epipleurum is a separate lobe and bears many small hairs. Below the ventro-lateral suture is the hypopleurum which is also setigerous and bears the tiny legs. The mesothoracic spiracle is annuliform and borne in a tiny area belonging to but above, the first part of epipleurum. The eusternum is a simple piece.

The first seven abdominal segments are as follows: Dorsally there are but two large pieces, the prescutum and scutellum. The scutum lies below the prescutum. The prescutum is divided by a median depression, thus forming with the scutum, four anterior prominences on each segment. The alar area lies below the scutum and is not strongly differentiated. It bears the annuliform spiracle. The dorso-lateral suture immediately below the alar area, is angulate on each segment, thus partially dividing the epipleurum into two parts, the anterior of which extends upward on the anterior margin, and the posterior of which extends upward on the posterior margin. Below the epipleurum is the ventro-lateral suture separating epipleurum from hypopleurum. The sternum is composed principally of the eusternum, with a small lateral arm of eusternum, and behind this at each side, the lateral arm of sternellum. The eighth segment contains only scutoscutellum with spiracle, epipleurum, hypopleurum and eusternum. The ninth and tenth segments are simple, the latter bearing the anus.

Pupa.—This is illustrated in figures 6 to 9. The figures illustrate the characters very distinctly, showing the kidney-shaped eyes, the epicranial and frontal sutures, frons, clypeus and labrum, mandibles, maxillae.

The abdominal regions are well shown in figure 8, which shows a transverse basal pretergite, the central prescutum, which by figure 7, we see is longitudinal divided. Behind this is the short transverse scutellum. At the sides of the prescutum are the scuti, and beyond these the alar regions. The dorso-lateral fold separates alar regions from epipleurum, the front portion of which bears the elliptical spiracle with linear valve. The ventro-lateral fold separates the epipleurum from hypopleurum. The sternum consists of three transverse sclerites, basisternum, eusternum and sternellum.

From a systematic standpoint the armature of the last segments is always very important in weevil pupae. In figures 6, 8 and 9 it is noticeable that the ninth pleural region bears an acute lobe or process directed laterally.

Phelomerus aberrans (Sharp) Junk.

Bruchus aberrans Sharp, 1885, Biol. Centr.-Amer., Coleopt., Vol. 5, November, p. 448.

Phelomerus distinctus Pic, 1912, L'Echange Linneenne, Vol 28, p. 92.

Phelomerus aberrans and var. *distinctus* Pic, 1913, Junk's Coleop. Cat., part 55, p. 9.

The typical form *aberrans* was described from David, Bugaba and Taboga Island, Panama. The variety *distinctus* was described from Colombia and Brazil. Specimens of typical

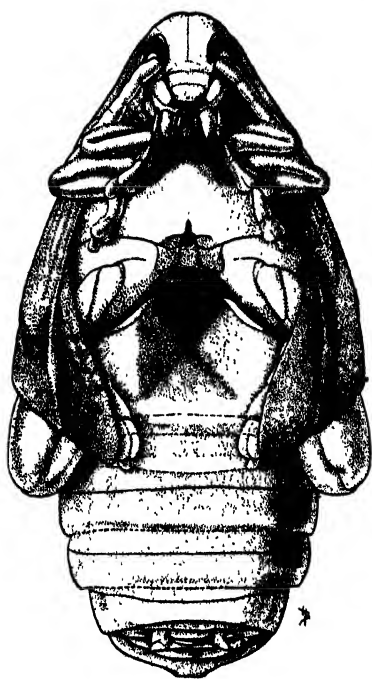


Figure 6. Venter of pupa.

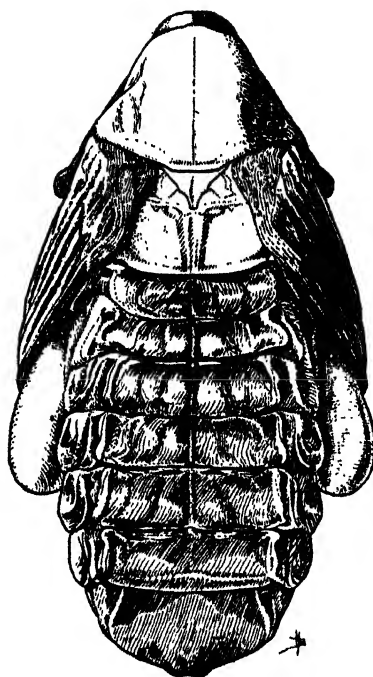


Figure 7. Dorsum of pupa.

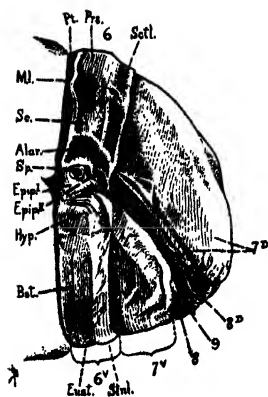


Figure 8. Side view of seventh to tenth pupal segments.

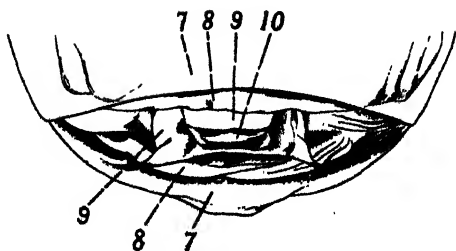


Figure 9. Posterior view of end of pupal abdomen.

aberrans are at hand from Belize, British Honduras, bred from *Cassia* beans, by C. F. Baker, under No. 5487. A large series was bred by E. A. Schwarz from pods of the *cañafistula* *cimarrona*, *Cassia grandis*, collected at Old Panama, Panama, in 1911, and at Paraiso, Canal Zone, March 15, 1911. Specimens were taken by August Busck on Tobago Island, Panama, June 9, 1911, and at Tabernilla, Canal Zone, June 17, 1911.

This is also a very pretty species. Only those points will be mentioned below in which it differs from *ochropygus*.

The constriction at base of epicranium, forming the collum, is absent, being replaced merely by a change of sculpture above. Beneath, this constriction is deep. The occipital area of collum is coarsely punctate, minutely reticulate. The epicranial suture is strongly elevated, and at base medianly sulcate. The suture separating epicranium from pregena behind the eyes is raised. The surface of the epicranium is densely rugoso-punctate, rather sparsely clad with brownish hairs with denser golden pubescence in the basal corners and in front of the eyes, and also is provided with the superciliary hairs on vertex. The labrium is reddish. The head beneath is reddish. The pregena is densely clad with golden hairs in parts adjacent to the eyes, but toward the pregula it is very sparsely punctate and setose. The antennae are reddish brown, with the 6th to 10th joints darker. The pregular smooth area projecting into the submentum is very small and inconspicuous. The pubescence of the under parts of the head is golden. The collum is very much inflated, globose, beneath; the depression being a broad deep arc, while the mental zone of the head is flattened. Generally speaking the collum consists of four zones, the occipital or dorsal, separated laterally from the genal by a faint line; the genal or lateral; and the gular or ventral. On the collum the gula and gena are deeply separated by depressions. From the base passing forward, are the two deep lines of the gular sutures which curve away from each other and terminate on the disc. A little in front of these are deep diagonal lines which almost meet medianly and which reach the transverse impression behind the eyes. These separate the gena and the gula from pregena and pregula. The pregular area is divided in two by the collar constriction, the basal portion being strongly convex and the apical portion, which may be more or less hyposternal, is flattened. At the base of the gula is a small definitely defined transverse quadrate piece, the postgula of Hopkins, or intersternite of Crampton.

ABBREVIATIONS.

Alar = alar region.

Bst. = basisternite.

D. = dorsum.

Dl. = dorso-lateral suture, or fold.

Epip. I = first epipleurite.

Epip. = II second epipleurite.

Eust. = Eusternite.

Eust. l. a. = ateral arm of eusternite.

Hyp. = hypopleurite.

Prs. = prescutum.

P. sctl. = postscutellum.

Pt. = pretergite.

Sc. = scutum.

Sc.-sctl. = scuto-scutellum.

Sctl. = scutellum.

Sp. = spiracle.

Stnl. = sternellum.

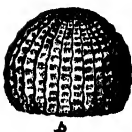
V. = venter.

V. l. = ventro-lateral suture, or fold.

THE EGG OF LAPHYGMA EXIGUA HÜBNER.

BY ROY E. CAMPBELL AND VICTOR DURAN,

Bureau of Entomology, United States Department of Agriculture.



The description and drawing of the egg of *Laphygma exigua* after Hoffman¹ quoted and illustrated in many old accounts of this insect, are incorrect, the upper cap, separated by a ring, being absent in all eggs examined by the writers. The eggs (Fig. 1) are typically noctuid, being spherical, but slightly flattened on top, with faint radiating longitudinal lines; iridescent pearly white or pinkish, 0.5 mm. in diameter. Before hatching they become darker and the head of the embryonic larva may be seen through the shell. The eggs are laid in clusters and are covered with hairs from the body of the moth.

Figure 1.—Egg of *Laphygma exigua*. a. Top view, b. side view (much enlarged).

A NEW SPECIES OF NOTARIS (COLEOPTERA: CURCULIONIDAE).

BY F. H. CHITTENDEN.

Notaris flavipilosus, new species.

Of similar form to *bimaculatus* Fab., elytra rather densely yellow-brown pubescent. Head distinctly, rather coarsely and densely punctate. Rostrum shining black, somewhat finely and sparsely punctate, more coarsely so at base

¹Die Ranfeu der schmetter Cinge Europas Eur. 50.68c.

and sides. Antennae red. Pronotum slightly wider than long; sides moderately arcuate; surface moderately coarsely, very densely, not subrugosely punctate, median smooth line polished with tendency to elevation; surface with scale-like yellow setae, directed irregularly transversely, forming a pronounced dorsolateral fascia each side. Elytra much wider than prothorax, arcuate at sides; humeri prominent, rounded; striae shallow, feebly, scarcely visibly punctate except in first three; intervals a little elevated, rather coarsely granulose, strongly pubescent, the vestiture consisting of elongate yellow hairs, especially long on the alternate intervals and toward the apex and a little more condensed to form an inconspicuous spot on third interval behind the middle. Lower surface coarsely, densely and nearly uniformly punctate, and with sparse squamules, fine and yellow. Apex of fifth abdominal segment distinctly reflexed. Tibiae serrate on inner edge, anterior pair more strongly so.

Length, 7.5–8.5 mm.; width, 2.8–3.5 mm.

Type-locality.—St. Michael, Alaska, July 31, 1916 (J. Aug. Kusche).

Type.—Male, Cat. No. 28834, U. S. National Museum. Type and allotype. Paratype in the collection of Dr. E. C. Van Dyke.

The writer is indebted to Dr. E. C. Van Dyke for the presentation of the type and allotype to the National Museum.

By its tibial structure and well developed elytral granulations this species will come next to *bimaculatus* Fab. in the key (Brooklyn Ent. Soc., Vol. 22, 1927, p. 37). The vestiture of elytra in *flavipilosus* is much more abundant and more hair-like than in *bimaculatus*. The former species differs also in having the sides of the prothorax less strongly arcuate, and sides of elytra a little more rounded.

BOOK NOTICE.

General Catalogue of the Hemiptera: Fascicles II and III of this work have recently been issued. Fascicle I appeared in 1927 and embraces the known Membracidae of the world, its author being Doctor W. D. Funkhouser. In this volume, which contains more than 560 pages, the general plans of the proposed comprehensive catalogue were announced. The project was first outlined at the Cincinnati meeting of the Society for Advancement of Science in the winter of 1923–24, when a committee of ten was appointed to undertake the work. The General Editor is Doctor G. Horvath of the Musée National Hongrois, Budapest, Hungary, and the Managing Editor is Doctor H. M. Parshley of Smith College, Northampton, Mass., which institution has published the fascicles previously mentioned. The general foreword written by Doctor Horvath,

indicates the plan and form of publication which will be adhered to throughout the work. This is followed by a list of 45 families in the Heteroptera and 19 in the Homoptera which it is proposed to recognize. In his introduction the author of Fascicle I emphasizes the principal objects of the catalogue as the recording of the history and synonymy of the insects treated. Complete synonymies of family, subfamily, genus, species and in some cases even subspecies, are included together with references to the original descriptions, including an indication of the general character of the articles in which these occurred. By the method followed, the synonyms are cross indexed and in addition are included in the general index at the end of the volume.

The genotypes are recorded throughout, the synonyms being italicised and the State, Province or Country of habitation of the species where known, are recorded at the right hand margin of the page.

Fascicle II, embracing the Mesoveliidae, a small family of bugs inhabiting stagnant or tranquil waters, is under the authorship of Doctor Horvath and consists of 15 pages.

Fascicle III embraces the Pyrrhocoridae, a family segregated in recent years from the Lygaeidae. It is a comparatively small group, only 360 species being recognized at present, many of which are brilliantly colored and of large or medium size. The family is primarily of tropical and subtropical distribution and it is believed has been but superficially investigated. The authorship of this volume is Doctor Roland F. Hussey of 660 Madison Avenue, New York, with a bibliography by Elizabeth Sherman. This catalogue when complete will undoubtedly comprise one of the most comprehensive and useful publications of its kind ever issued.

—W. R. Walton.

Actual date of publication, March 24, 1930.

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No. 4

DESCRIPTION OF THE LARVA OF *CEROTOMA TRIFURCATA*
FORSTER (COLEOPTERA: CHRYSOMELIDAE).

BY ADAM G. BÖVING,

Bureau of Entomology, U. S. Dept. of Agriculture, Washington, D. C.

The main purpose of this paper is to give an illustrated, full description of the mature larva of *Cerotoma trifurcata*. The descriptive matter is followed by a discussion of the systematic position of the genus, particularly in relation to the genus *Diabrotica*, and, in conclusion, the results of this discussion are summarized in the form of a short key.

ACKNOWLEDGMENT.

The following description and drawings are made from specimens of a well preserved and copious lot of mature larvae of the species which most kindly were submitted to me by Dr. Dwight Isely, Associate Entomologist at the Agricultural Experiment Station of the University of Arkansas, Fayetteville, Arkansas, who has just completed a biological study of the beetle.

DESCRIPTION OF *Cerotoma trifurcata* FORSTER.¹

MATURE LARVA.

(U. S. National Museum; one vial marked "University of Arkansas, College of Agriculture; received October 2, 1929. Reared and given by Dwight Isely.")

GENERAL ASPECT.

The larva (figs. 9 and 11) is about 7 to 10 mm. long and about 1 to 1.5 mm. in width. It is legged, subcylindrical, somewhat flattened above and below, and rather straight. The individual segments of the body do not differ much from one another in length and the whole body tapers only slightly forward from the first six abdominal segments toward the anterior margin of the prothorax and backward to the beginning of the ninth abdominal segment. The

¹A description with habitus figures of the larva was published for the first time in 1897 by F. H. Chittenden in his paper "The Bean Leaf Beetle" (U. S. Dept. of Agriculture, Entomological Bulletin No. 9, new series, pp. 64-71). The latest contribution with habitus figures of egg, larva, pupa, and imago is given by Dwight Isely (Agricultural Experiment Station, Arkansas, Bulletin No. 248, pp. 1-20; 1930).

head is broadly oval, hypognathous, somewhat retractile into the prothorax and the ratio of its greatest width to the width of the prothorax at its posterior margin is as one to one and one-half. The prothorax is provided with a dorsal shield; the meso- and metathorax are without any, and the abdominal segments are also completely soft with the exception of the ninth which carries a large pygidial shield or plate. The different areas of the segments are distinguishable but not limited by deep grooves, intersegmental belts are present and complete between the abdominal segments, and the tenth abdominal segment is developed as a soft pygopod. The legs (fig. 7) are inserted far apart, are attached to small hypopleural scleromes (*hy*, fig. 7), are short, and all of about the same size. Each consists of a sessile, low, and oval coxa, a trochanter, a femur, a tibia, and a falciform claw covered on the posteriorly facing side by a thin, clear, leaflike paronychial appendix. The spiracles (fig. 4) are circular, small, and in nine pairs and all lateral.

The head capsule is shining, generally dark olive-brown but the epicranial halves are lighter colored on the middle of the dorsal surface and the frontal sutures are white; the epistoma, a stiletto mark in the sagittal middle line of the frons, the antennal rings, and the hind margins of the epicranial halves are almost black; the mentum (*m*, fig. 5b) is white with a paramedian pair of darker spots, and the prementum (*pm*) is white with a dark brown thin band at base; the tips of the mandibles are almost black; the setae on the head, almost white.

The soft-skinned parts of the body are milky white; the prothoracic shield is light olive-brown but with numerous, irregularly arranged, cloudy, dark spots and a white line sagittally (fig. 6). The main color of the pygidial plate (fig. 8) is dark olive-brown, but posteriorly it becomes almost black while anteriorly and toward the lateral margins it is rather light; it is densely speckled all over with small blackish dots except medio-anteriorly in an elongate triangular area that is whitish, and medio-posteriorly where the small dots gather together into a paramedian pair of large, blackish, more or less confluent round spots. On the under side of the free and thick margins of the shield is a paramedian pair of light olive-brown round spots and on each side of the base of the pygopod is a small darkening of the skin (fig. 10). The hypopleural scleromes are blackish; the legs (fig. 7) are pale grayish brown with the coxal ring blackish and the other joints dark colored at the articulations; the claws are black, and the paronychial appendices clear and colorless like water. The spiracles are pale and easily overlooked (fig. 4). Setae and setal cups are whitish.

DETAILS.

The head capsule (figs. 1a, 1b, and 2) has distinct, nearly straight frontal sutures converging posteriorly and forming an almost right angle. The epicranial suture is only slightly shorter than one-half the length of the frons measured from the middle of the anterior edge of the epistomal margin to the posterior end of the frontal shield. The frons bears a median inner carina marked on the upper side by the stiletto-like dark figure. The epicranial halves have rounded, not greatly produced hind margins, which are separated posteriorly by an approximately semicircular space. The setae of the head

are fairly long and on each side placed as follows: On the frons, four setae, viz., one in the epistomal margin (*e*) midway between the frontal carina and the dorsal mandibular articulation (*m*); one in the dark antero-lateral corner of the frons between the mandibular articulation and the basal skin of the antenna; one in the middle part of the frons equidistant from both of the two former setae, marking together with them an imaginary isosceles triangle; and a small one near the posterior angle of the frons. On the epicranium there are four setae in a semicircle around the antennal ring, namely, one dorsal (*a*) near the frontal suture, one ventral (*d*, fig. 2) diametrically opposite, placed in the peristomal margin (*p*), and two lateral (*b* and *c*, fig. 2) between these; on the dorsal epicranial surface, two setae are placed at each end of an imaginary oblique transverse line somewhat anterior to the middle, and on the ventral epicranial surface are two setae.

The clypeus (*Cl*, fig. 1b) is about eight times as wide as long; posteriorly it is thinly chitinized and is furnished on each side with a single transverse series of three to four minute setae.

The labrum (*L*, fig. 1b) is free, has a corneous part posteriorly about as long as and three-fourths as wide as the clypeus, and has a fleshy, transversely oval part anteriorly which is continuous with the epipharynx below. One long seta is present near the lateral margin, another similar seta is found between this and the sagittal middle line, and along the soft-skinned anterior margin is a transverse series of densely set, small setae of slightly varying length and shape.

The ocelli are absent.

The antenna (fig. 1a) is apparently two-jointed but has in reality only one joint (*I*) which carries apically, besides some small sensory papillae, a joint-like sensory appendix (*s*). The basal membrane (*mb*) is large, permitting a complete retraction of the antenna; the antennal joint is provided with a rather low, pale cylindrical sclerome at base and a well developed membrane apically; and the sensory appendix has also a low, ring-shaped basal chitinization and is tipped by a large, thin, white tactile conus, three times as long as the basal chitinization.

Each mandible (figs. 2 and 3) is palmate with inner surface concave; there are five teeth distally of which the exterior and ventral fifth is smaller than the rest, while the third is the largest; the third, the second, and the fourth are slightly serrated. The inner margin of the mandible carries, about medianly between the base of the first tooth and the inner end of the hind margin, a series of three stiff, short, closely set bristles (*b*) which gradually decrease in length from the anterior to the very small posterior one. The exterior side of the mandible has two well developed setae.

The ventral mouthparts (figs. 5a and 5b) are retracted; the maxillary articulating area (*mar*) is slightly corneous and indistinctly separated by a fine groove from the submental-mental area.

The maxilla (figs. 5a and 5b) has a simple, transverse cardo, a large subtriangular stipes, and a mala divided into galea and lacinia. The stipes is armed with four large setae, namely, one in the corneous margin behind the mala, two exteriorly in the broad anterior part, and one seta in the attenuated posterior part of the chitinization. The galea consists of a distal and a proximal

section; the distal (g^2) is slightly corneous and carries several irregularly distributed, rather short setae and, in its antero-interior corner, a conical peg (pg) in a cylindrical basal piece; the proximal section (g^1) is soft skinned and without setae. The lacinia (la) is covered ventrally by the posterior section of the galea but freely exposed dorsally toward the cavity of the mouth, and it is armed with a series of about five strong, pointed, somewhat flat, shining setae. The rather large palpiger (plg) is furnished with a corneous plate and armed with two setae. The palpus is three-jointed; the basal joint is short, cylindrical, about two times as wide as long, and has a ring-shaped sclerome at its base; the second joint also is furnished with a corneous ring at base, twice as long as that of the basal joint and about as wide as long, and it carries two well developed setae; the apical joint is conical, half as wide as and as long as the second, and it has one seta.

The gula is not present.

The submentum and mentum (sm and m , fig 5b) are fused, membranous, light colored with a pair of darker spots in the central part of the region. Near the anterior end of each spot are two setae, one in front of the other, and posterior to it is a third seta.

The prementum (pm , fig. 5b) is limited behind by a narrow, transverse, curved, and corneous band; one seta is present in the band and another in front of it at the beginning of the ligula. The labial palpi are well developed and two-jointed with the basal joint about half as long as wide; and the conical apical joint about twice as long as the basal joint and half as wide.

The ligula is soft, short, rather wide, indistinctly limited.

The epipharynx (*Epip*, fig. 1b) is soft and carries numerous straight or curved, rather long papillae.

The hypopharynx (h , fig. 5a) is soft, and its anterior region above the ligula bears minute papillae; the paragnaths (pgn) are present as a pair of low, soft lobes, densely beset with dome-shaped warts tipped by very short hairs.

The prothorax (figs. 6, 9, 11) is slightly broader than long with the greatest width somewhat in front of the hind margin where it is almost twice as wide as the head; the tergal shield is rather flat, smooth, formed as a broad escutcheon and separated sagittally by a whitish, finely jagged suture extending throughout its entire length; setae-bearing tubercles absent. On each side are found four setae anteriorly in a transverse row and three setae in an imaginary oblique line from the middle of the lateral margin to the beginning of the posterior fourth part of the sagittal suture; alar area (al , fig. 11) with two setae. The pre-epipleurum (e) has one seta close to the anterior end of the hypopleural chitinization; the post-epipleurum (e^2) also has one seta. The hypopleurum (hy , fig. 7) has a sclerome with a subtriangular, anteriorly wider, thick and almost black-colored lower margin; it bears no setae. The jugular membrane (j , fig. 11), possibly homologous with the presternum, is crescent-shaped and without setae. The eusternum and the sternellum are not distinctly separated but form together a common area. This is marked with a median arrow-like and forward-pointing figure, and is armed on each side with an anterior seta about in transverse line with the arrow's point and a posterior seta in transverse line with the hind end of the arrow's shaft. The posternellum is triangular, large, and without setae (*psil*, fig. 11).

The mesothorax is wider than the prothorax, and the metathorax wider than the mesothorax. The mesothorax is provided with a fully developed spiracle, but the metathorax has a vestigial one only. Otherwise the two segments are much alike (figs. 9 and 11). The dorsal part of the tergum of each of the segments is divided by a transverse groove into two areas, namely, prescutum (*ps*) and scuto-scutellum (*s-sl*) and each of these is again subdivided by faint longitudinal and curved grooves into a median division (*md* and *mx*, fig. 9) and, on each side, an exterior division (*ed* and *ex*); the median divisions carry a seta on each side, and each of the exterior divisions has one seta. Each alar area (*al*, fig. 11) bears two setae. Each epipleurum is divided by the alar area into a pre-epipleurum (*e*), with one seta, and a large triangular post-epipleurum (*e²*), with one seta. Each hypopleurum has a sclerome but no seta. The sternum is divided into a presternum (*prs*), paired, lateral, and subtriangular; a eusternum, unpaired; a sternellum, almost paired and separated from the eusternum by a V-shaped groove; and a post-sternellum (*psll*), unpaired, lanceolate, and limited behind by the presternal parts of the next segment. The presternum and post-sternellum are without setae, the eusternum and sternellum have one each.

The first to seventh abdominal segments (figs. 9 and 11) are all alike in general shape, slightly decreasing in length and width forward from the third and backward from the fifth segment, and each segment is separated from the subsequent one by an intersegmental ring-shaped region (*i*); the latter is formed above the ventro-lateral suture (*v*) by postscutellum (*psl*) and below it by a fusion of post-sternellum and the presternum of the following segment. The setal arrangement on each side is as follows: Intersegmental region (*i*) without setae, prescutum (*ps*) with three setae in a transverse series, scutum (*s*) with one seta, scutellum (*sl*) with two setae, alar area (*al*) with one seta, epipleural lobe (*el*) with two or three setae, hypopleurum (*h*) with two or three setae, the eusternum (*st*) with one seta, and the sternellum (*stl*) with two setae.

The eighth abdominal segment (figs. 9, 10, 11) has the same number of setae as do the preceding segments but is not separated from the ninth by an intersegmental ring.

The ninth abdominal segment (figs. 8, 9, 10 and 11) is about as long as one of the preceding segments and is almost as wide anteriorly, but it is approximately semicircular, merely slightly longer than wide in dorsal view. The pygidial shield is flat, covering the entire dorsal side of the segment; no urogomphi (= cerci auctorum). The surface of the shield is leather-like and colored as described above. On each side it is armed with four well developed setae arranged in a single row and inserted either in, slightly below, or slightly above the free margin of the shield; in the central part of the shield are two minute setae, one in front of the other. On the ventral side of the segment (fig. 10) and situated anteriorly to the base of the pygopod is a transverse row of four small setae, two on each side.

The tenth abdominal segment (fig. 10) is developed as a soft pygopod, with a dark spot and a minute seta on each side. The anus is in the center of the rounded sucking surface.

TAXONOMIC COMMENTS.

The *Cerotoma* larva belongs to the group of chrysomelid larvae, including those of *Diabrotica* and *Phyllobrotica*, which occupies an intermediate position between the Galerucinae and the Halticinae but which approaches the latter more closely, and logically seems to have its place in this rather than in the former subfamily. As with the typical Galerucinae the larvae of this group possess an epicranial suture, very short in *Phyllobrotica* but well developed in *Diabrotica* and *Cerotoma*, whereas typical halticine larvae are without it. However, unlike the galerucine larvae in which is found one well developed, projecting ocellus on each side of the head, these larvae are entirely without a similar ocellus or even a pigmented ocellar spot and resemble, not only in this character but in general habitus, the Systemini-Crepidoderini-Psylliodini group of the Halticinae.

The *Phyllobrotica* larva is characterized, in addition to the just-mentioned extreme shortness of its epicranial suture, by having the prothoracic shield and the pygidial plate poorly sclerotized and indistinctly limited, in contrast with which the *Diabrotica* larva has a well developed epicranial suture, a distinct prothoracic shield, and a distinct pygidial plate; and in these and most other characters the *Cerotoma* larva is identical with the *Diabrotica* larva. In fact, the larvae of these two genera can be separated only by the following small differences: In *Cerotoma* the body is somewhat shorter and broader, and the grooves that limit the segmental areas are not so deep as in the known larvae of the different species of *Diabrotica*; the frontal sutures are straight, and form posteriorly an angle of about 90° in *Cerotoma* while in *Diabrotica* they are somewhat curved and form an angle of about 60° only; the mandible has three short spines posteriorly on the inner margin in *Cerotoma* but four fairly long ones in *Diabrotica*; and the inside of the spiracular mouthpiece is smooth in *Cerotoma* but beset with numerous short spinules in *Diabrotica*. In *Cerotoma trifurcata*, the only species of the genus present in North America, the pygidial plate is entirely without urogomphi (= cerci) and differs in this character from the larvae of *Diabrotica duodecimpunctata* Fabricius, *Diabrotica vittata* Fabricius, and other species of the genus, but not from *Diabrotica longicornis* Say in which the urogomphi also are absent.¹

¹Böving, Adam G.—Descriptions of larvae of the genera *Diabrotica* and *Phyllobrotica*, etc. (Proc. Ent. Soc. Washington, Vol. 29, 1927, pp. 194-206, 1 plate).

Böving, Adam G.—Beetle larvae of the subfamily Galerucinae (Proc. U. S. Nat. Mus. No. 2773; Vol. 75, 1929, pp. 40-41).

The results of this discussion on the systematic position and characterization of the larva of *Cerotoma* may briefly be expressed by the following key.

KEY SHOWING THE TAXONOMIC RELATIONSHIP OF CEROTOMA.

1. Ocelli and epicranial suture present; first to eighth abdominal segments never entirely without small dorsal plates and setae, and with dorsal setae arranged in two or three transverse rows *Galerucinae*.
(in limited sense).
- Either without ocelli, or without epicranial suture, or without both; or first to eighth abdominal segments either fleshy and without setae, or with dorsal setae arranged in a single transverse row 2
2. Epicranial suture absent except in genera with a single transverse row of dorsal setae on the abdominal segments; ocelli present or absent
Halicinae.
(as commonly conceived.)
- Epicranial suture present (dorsal setae arranged in three transverse rows on the abdominal segments) ocelli absent 3
3. Dorsal shields of prothorax and the ninth abdominal segment poorly developed and indistinctly limited; urogomphi absent; epicranial suture very short *Phyllobrotica*.
- Dorsal shields of prothorax and ninth abdominal segment distinct; urogomphi absent or present; epicranial suture of moderate length 4
4. Frontal sutures straight and forming posteriorly an angle of about 90°; mandible with three short bristles posteriorly on inner margin (urogomphi absent) *Cerotoma*.
- Frontal sutures somewhat curved and forming posteriorly an angle of about 60°; mandible with four moderately long bristles posteriorly on inner margin 5
5. Urogomphi absent *Diabrotica longicornis*.
- Urogomphi present
Diabrotica duodecimpunctata, *D. soror*, *D. vittata*, and other species.

EXPLANATION OF PLATE.

(DRAWN BY THE AUTHOR)

Cerotoma trifurcata Forster.

- Fig. 1. Dorsal part of head capsule showing exterior view (*1a*) to the left, and interior view (*1b*), to the right; *a*, seta from a series around the antennal base; *b*, another seta from series around antennal base; *Cl*, clypeus; *e*, epistoma; *Epip*, epipharynx; *L*, labrum; *m*, dorsal mandibular articulating place; *mb*, basal membrane of antenna; *s*, sensory appendix of antenna.
- Fig. 2. Back of mandible, and antenna seen from above; *a*, *b*, *c*, and *d*, setal cups around base of antenna; *p*, peristoma; *1-5*, five teeth of mandible.
- Fig. 3. Left mandible; *b*, bristle on inner margin; *1*, dorsal tooth.
- Fig. 4. Mesothoracic spiracle.

- Fig. 5. Ventral mouthparts, dorsal side (5a) to the left, ventral side (5b) to the right; *g*¹ and *g*², galea; *h*, hypopharynx; *la*, lacinia; *m*, mentum; *mart*, maxillary articulating area; *pg*, peg-like process on galea; *pgn*, paragnath; *plg*, palpiger; *pm*, prementum; *sm*, submentum.
- Fig. 6. Prothoracic dorsal shield.
- Fig. 7. Left leg, posterior view; *cl*, claw; *coxa*, coxa; *f*, femur; *hy*, hypopleural sclerite; *pa*, paronychial appendix (= empodium); *ti*, tibia; *tr*, trochanter.
- Fig. 8. Pygidial plate (or pygidial shield) dorsally on ninth abdominal segment.
- Fig. 9. Dorsal view of larva, about 7.5 mm. long; *ed*, exterior portion of prescutum; *ex*, exterior portion of scuto-scutellum; *md*, median portion of prescutum; *mx*, median portion of scuto-scutellum.
- Fig. 10. Eighth, ninth, and tenth abdominal segments, ventral view.
- Fig. 11. Lateral view of larva, about 7.5 mm. long; *al*, alar area; *e*, pre-epipleurum; *e*^a, post-epipleurum; *el*, epipleural lobe; *h*, hypopleurum; *i*, intersegmental region; *j*, jugular area; *prs*, presternum; *ps*, prescutum; *psl*, postscutellum; *psil*, post-sternellum; *s*, scutum; *sl*, scutellum; *s-sl*, scuto-scutellum; *st*, eusternum; *stl*, sternellum.
- Scale applicable only to figs 9, 10 and 11.

THE EFFECT OF LIGHT UPON THE DEVELOPMENT OF THE DARK MEAL WORM, *TENEBRIO OBSCURUS* FAB.

By RICHARD T. COTTON, *Senior Entomologist, U. S. Bureau of Entomology.*

Owing to the fact that but few experiments designed to show the effect of light on the normal rate of growth and development of insects have yielded positive results, it seems worth while to record the following observations on the effect of light on the development of the dark meal worm, *Tenebrio obscurus* Fab.

Under favorable conditions, larvae of the dark meal worm, that hatch in the spring or early summer months, become apparently fully grown by the middle of August. They do not transform at that time but normally remain as larvae, with but little change in size or outward appearance, until the following spring. If the larvae are kept in a heated room, development is hastened and a certain percentage may begin to pupate in November or December.

During the course of a study of the biology of the dark meal worm it was noted that light had a marked effect upon the larvae, so much so that, when well grown worms were kept continuously in light they quickly began to pupate regardless of the season. Many such observations were made and, for

purposes of record, detailed notes were kept on a group of ten worms that were removed from the stock colony and placed in a small incubator at room temperature but with continuous light. The worms were placed in a glass petri dish with a quantity of food sufficient for feeding purposes but not great enough to afford protection from the light. The stock colony was kept in a covered tin box from which light was excluded.

The ten worms were exposed to the continuous light (provided by a 10-watt lamp), on August 23, 1929. They pupated on the following dates: No. 1 on Sept. 14, 1929; no. 2 on Sept. 17; no. 3, on Sept. 20; no. 4 on Sept. 21; no. 5 on Sept. 22; no. 6 on Sept. 26; no. 7 on Oct. 18; no. 8 on Nov. 5; no. 9 on Nov. 18. The 10th had not pupated by the 1st of February, 1930.

In the stock colony, kept in complete darkness but at the same temperature as the others, the first pupation occurred on Dec. 7. In similar colonies a few pupations occurred in late November.

The above records indicate that the effect of continuous light upon full grown larvae of the dark meal worm, that normally breed in a darkened environment, is to accelerate markedly the transformation to the pupal state.

It is well known that many insects have a higher rate of metabolism in light than in darkness, hence it seems probable that a sudden increase in the metabolic rate, induced by the exposure to continuous light, is responsible for shortening the larval period of the meal worms and accelerating the process of transformation to the pupal and adult stages.

Under normal circumstances the meal worms transform in the spring or early summer months when there is a considerable increase in temperature over winter conditions. This increase in temperature causes a corresponding increase in the rate of metabolism of the over-wintering meal worms which in this case doubtless exerts a controlling influence over the process of transformation.

By holding meal worm larvae at temperatures below normal they can be prevented from transforming at the regular period, and by the use of light and warmth they can be induced to transform without passing through the normal hibernation period; hence, with the proper use of these three agents, a supply of all stages of the dark meal worm can be obtained at all times of the year.

These methods of controlling the development and transformations of the meal worm should be of particular interest to those who wish to breed meal worms for bird or fish food or for purposes of research.

A NEW NAME FOR THE GENUS QUIPPELACHNUS OESTLUND
(APHIIDAE, HOMOPTERA).¹By A. A. GRANOVSKY, *University of Wisconsin.*

In the study of aphids belonging to the tribe Callipterini one meets with a number of difficulties and apparent confusion as to the correct generic position of several species, as well as to the proper definition of certain genera. In 1920 Baker (2), in his generic classification of aphids, redefined with synonymy all of the aphid genera then known to him and listed the type species of each genus, thus rendering immeasurable aid to aphidologists. Since that time several new aphid genera have been erected and among them is *Quippelachnus* proposed by Oestlund (7) with the type species *Euceraphis gillettei* Davidson. He based his genus on the relative length of unguis as compared with the base of the sixth antennal segment, the presence of radial sector and the bulging at the base cornicles.

Davidson (3 and 4) described two species *flava* and *gillettei* under the genus *Euceraphis*, erected by Walker (13) with *Aphis betulae* Linn. as type of the genus. Unfortunately Walker, as many workers of his day, did not define his genus, but the genotype *betulae* Linn. is a well known species and offered no difficulty in including under *Euceraphis* several closely related species.

Although both species, *flava* and *gillettei* have several characters in common, and typically those of *Euceraphis*, Davidson (4) three years later, after *flava* was described, realized that his *flava* departs in a number of characters from the species correctly belonging to *Euceraphis*, and placed it in the genus *Eucalipterus* erected by Schouteden (8 and 9) with *Aphis tiliae* Linn. as the type. In this he was followed by Essig (5) and Swain (11), showing that they agreed with him in existing generic differences of *flava*.

Since *tiliae* Linn. is co-generic with *ononidis* Kalt., the type of *Therioaphis* Walker, as shown by Baker (2), and Schumacher (10) further showed that *Therioaphis* is a synonym of *Leptopteryx* Zetterstedt with *L. nivalis* Zett. as a type of the genus, it is evident that *Eucalipterus* becomes a synonym of *Leptopteryx* Zett. However, *flava* Davidson can not be included in this genus for it is widely different from the species treated under it. It is much nearer to *Euceraphis*, and yet differs from it in several respects.

The characters of *Euceraphis* are well defined by Baker (2) and need not be repeated here. Baker (1) also gave the key to the American species of *Euceraphis* in which he included *flava*

¹Contribution from the Department of Economic Entomology, Wisconsin Agricultural Experiment Station.

Davidson. From this key it is evident that *flava* differs from the typical Euceraphis species by having a distinctly bilobed anal plate.

Oestlund (7) in erecting his *Quippelachnus*, used *gillettei* Davidson as the type of the genus. He doubtless misinterpreted the species. He evidently mistook *gillettei* for *flava*, because the cornicles of *gillettei* are not bulging at the base in the Lachnus-like fashion as the name of his genus indicates. This character is typical of *flava* as illustrated by Davidson (3 and 4) and is shown here (fig. 7).

Takahashi (12) in his recent list of aphid genera correctly placed *Quippelachnus* as a synonym of *Euceraphis*, in so far as *gillettei* Davidson is concerned, for it is quite similar to *betulae* (Linn.) in all of the generic characters.

Both species *flava* and *gillettei* are quite common on *Alnus* in northern Wisconsin as they probably are throughout the northern states and Canada. The writer had the opportunity of collecting them frequently and studying their characters and habits. In addition to his own material, the writer examined the type slides of both *flava* and *gillettei* through the kindness of Mr. W. M. Davidson and the U. S. Bureau of Entomology. While visiting Dr. O. W. Oestlund in 1925, the writer had the opportunity through Oestlund's courtesy to examine his material of both species. At that time Oestlund's attention was called to the possible misinterpretation of species.

It may be of interest to mention here that *gillettei* Davidson is treated by Oestlund (7) as *alnifoliae* (Fitch) under *Euceraphis*; and in a like manner *Myzocallis alnifoliae* (Fitch) he erroneously considers under *Pterocallis alni* (De Geer), as shown by Granovsky (6) after examining Oestlund's material.

The genera of the Callipterini are quite well differentiated and are founded, among other structures, mainly on such characters as the types of cornicles, antennae, sensoria, wing venation, caudae and anal plates.

A careful study of *flava* Davidson reveals that it differs from *Euceraphis* species in a number of generic characters such as the cornicles, sensoria, cauda and anal plate, and deserves an independent position, as was recognized by the several workers mentioned above. In order to remove the already existing and possibly future confusion, it is deemed advisable to propose a new name for *Quippelachnus* Oestlund, which was erected for *flava* characters, but for which *gillettei* was used as the type by error. This new genus, *Oestlundiella*, the writer is erecting in honor of Dr. O. W. Oestlund, one of the oldest living aphidologists, whose contributions to the knowledge of aphids, although not many, are of interest and value.

Oestlundiella, new genus.

Body elongated. Antennae of six segments, somewhat longer than the body, provided with subcircular or oval sensoria and a few bristle-like hairs. Sensorium at the base of the unguis small, circular with a few auxiliary sensoria on each side. Antennae placed on distinct, but not large, diverging frontal tubercles. Cornicles truncate, constricted in the middle and placed on broad swollen or bulging bases. Cauda elongated, cordiform and indefinitely knobbed in spear-like shape, with constriction near its distal half. Anal plate distinctly and broadly, but not deeply bilobed. Both, cauda and anal plate, hairy. Forewing with venation normal, media twice branched; stigmal vein present, not deeply curved; hind wings with media and cubitus present. Forms are large, but delicate, living in small colonies and singly. Waxy secretion on legs and body is present. Antennae of oviparous females also bear a few subcircular secondary sensoria.

Genotype, *Euceraphis flava* Davidson.

This genus is closely related to *Euceraphis* and occupies the position between *Calaphis*, *Cepigillettea* and *Euceraphis*.

In the structure of antennae, body form and waxy secretion *Oestlundiella* resembles the genus *Euceraphis*, but it differs from it in that of having its anal plate definitely bilobed, cordate cauda with a broad spear-like constriction, and cornicles placed on broad, swollen bases. All of the species belonging to *Euceraphis* in contrast, have their anal plates usually entire or only very indistinctly imarginate, caudae perceptibly knobbed and cornicles much longer than wide, which are not placed on swollen bases.

The genus *Oestlundiella* approaches *Calaphis* and *Cepigillettea* by subcircular or oval sensoria; notched anal plate and by the presence of sensoria on the antennae of oviparous females. It differs from *Calaphis* by the large cauda in which respect it approaches *Cepigillettea*, although the type of cauda is differently shaped.

The figures depict the type of sensoria of antennal segment III, cornicles, caudae and anal plates of alatae of *betulae* (Linn.) the type of *Euceraphis flava* (Davidson) the type of *Oestlundiella*; and *Euceraphis gillettei* Davidson with which *flava* was confounded.

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EXPLANATION OF DRAWINGS.

Euceraphis betulae (Linn.).

1, Sensoria of antennal segment III; 4, cauda and anal plate; 8, cornicle.

Euceraphis gillettei Davidson.

2, sensoria of antennal segment III; 5, cauda and anal plate; 9, cornicle.

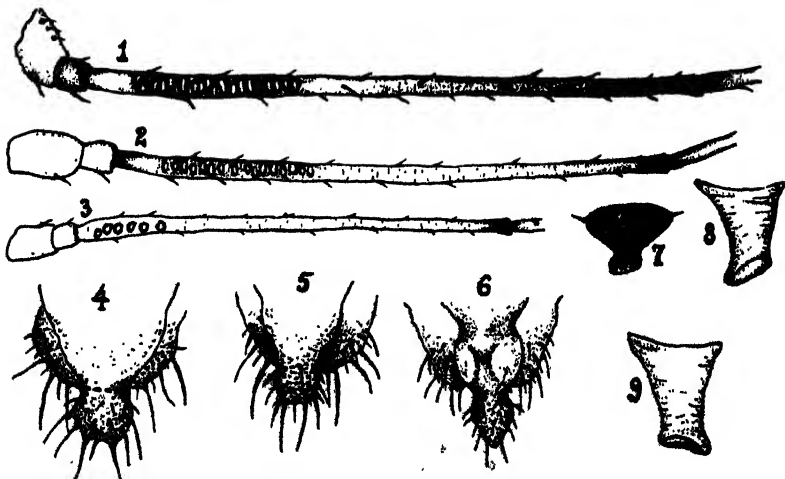
Oestlundella flava (Davidson).

3, sensoria of antennal segment III; 6, cauda and anal plate; 7, cornicle.

NOTE.—All antennal segments are drawn to the same scale.

All drawings of cornicles, caudae and anal plates are made to the same scale.

All drawings therefore are comparable.



A NEW SPECIES OF MACROCENTRUS FROM OHIO (HYMENOPTERA: BRACONIDAE).

BY FRANK D. DEGANT.

Macrocentrus pallisteri, new species.

Female.—Length 7 mm. Length of exerted portion of ovipositor 8 mm., issuing before apex of abdomen. Length of anterior wing, 5 mm. Head transverse, smooth and shining; face with weak setigerous punctures and clothed with short fine hairs which are longer on the clypeus. Clypeus convex, truncate at apex. Eyes regularly elliptical. Ocelli prominent; distance between the lateral ocelli slightly greater than the distance between the lateral and median ocellus and about equal to that from lateral ocellus to eye margin. Scutum and scutellum polished, impunctate. Notauli weakly foveolate, joined at middle of mesoscutum and continued as a groove to the base of the scutellum. Scutellar groove foveolate. Propodeum finely transversely rugose, without a median carina. Mesopleura polished with sparse punctures. Hind basitarsus not quite so long as the following tarsal joints together. The distance between the spiracles of first abdominal segment distinctly greater than the distance from spiracle to base of tergite. First three tergites finely aciculate striate, the following tergites very faintly shagreened.

Stramineous: interocellar area, vertex, eyes, metathorax, propodeum, and tergites beyond the third black; flagellum reddish-brown. Mandibles pale yellow, tips black. Wings hyaline; stigma dark brown, pale yellow at base; veins dark brown. Legs uniformly stramineous.

Type locality.—Cleveland, Ohio.

Type.—Cat. No. 41909, U. S. N. M.

Described from one female, collected July 28, 1928. Named in honor of my friend, Mr. J. C. Pallister, Curator of Entomology, The Cleveland Museum of Natural History.

THE SCIENTIFIC ATTITUDE IN NOMENCLATURE.

BY W. L. McATEE.

The systematic nomenclature of organisms has grown to be a very complex matter and sound decisions as to details can be rendered in each case only by an advanced specialist in the particular field involved.

Interference in nomenclature by non-taxonomists and by those poorly informed about the matter at issue, which from the very nature of the subject usually is the case when action is taken by committees and congresses, can not be accepted by specialists as binding upon them.

When the ruling is in accordance with his findings from the available data, well and good, but when it is not, the systematist

can not be expected to reject evidence, disregard principles, and in general stultify himself in order to conform to an ill-considered decision. The attempt to fix nomenclatorial points definitely and for all time disregards the fact that new evidence is constantly turning up and must be considered. It is unjust, illogical, and unscientific to try to prevent the consideration of all the evidence bearing on a given topic. In true science all questions are forever regarded as open, and all findings subject to change.

In brief we conclude that "decisions" of committees and congresses on details of nomenclature, the selection of certain names to be permanently conserved, and in fact the making of any exceptions to the basic principles of nomenclature, are not binding on systematists. The latter must work out nomenclatorial problems according to recognized principles, must take into account all available data, reconsider decisions whenever new information comes to hand, and preserve an open and flexible mind in all cases. No other attitude is scientific.

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SOME NEW SPECIES AND A NEW GENUS OF PARASITIC
HYMENOPTERA FROM BRITISH COLUMBIA.

BY OSCAR WHITTAKER.

The specimens upon which the following descriptions are based were all collected by the writer, in whose collection, except where otherwise stated, all type material remains.

BETHYLIDAE.

ANTEON Jurine.

Anteon flaviscapus, new species.

Male.—Black; mandibles, except tips, pale yellowish; antennae dark brown, the scape yellow; legs, including coxae, yellow, hind femora and tibiae and all tarsi apically slightly dusky. Head, viewed from above, about one and one-half times as wide as long, viewed from in front, a little more than one and one-third times as wide as long; front margin slightly convex, hind margin separated from occiput by a fine carina; vertex with a shallow, transverse depression in front of anterior ocellus, without a carina as in *A. hirtifrons* n. sp.; with very shallow punctures and scattered white hairs; frons more densely hairy; temples and cheeks smooth, separated from eyes and occiput by fine carinae and with a carina running from base of mandibles to eyes. Eyes and ocelli large, the latter in a triangle; lateral ocelli as far apart as from the occiput and considerably further than this from the eyes. Antennae longer than head and thorax combined, clothed with erect pubescence; scape slightly wider than the flagellum, two and one-half times as long as wide; pedicel two-thirds as long as scape; joints 3, 8 and 9 equal, about one and one-half times as long as pedicel; joints 4-7 equal, very slightly longer than joint 3, three times as long as wide; apical joint the longest, as long as scape. Thorax smooth and shining; pronotum short, mesonotum with very shallow, indistinct punctures; notauli reaching to about the middle of mesonotum, a fine carina running from the humeral angles to base of scutellum which is separated from the mesonotum and metanotum by deep, punctate foveae. Propodeum coarsely rugose. Wings hyaline, with fine brown pubescence, nervures and stigma brown, the latter basally white; radius about as long as stigma, straight, obtusely angled about two-thirds its length from the base. Abdomen smooth and polished.

Length, 1.5-1.8 mm. *Expanse*, 3.5-4.0 mm.

Described from eight specimens: six from Hollyburn, British Columbia (Type loc.), 7-18 June, 1928; one from Chilliwack,

B. C., 12 June, 1927, and one from Galiano, B. C., 27 June, 1929.

Paratypes sent to U. S. N. M., Mr. Robert M. Fouts and Dr. A. A. Ogloblin.

***Anteon hirtifrons*, new species.**

Male.—Black; mandibles, except tips, pale yellowish; antennae rufous, basal half of scape brownish-yellow; front and middle legs, including coxae, yellow, middle femora dusky beneath; hind legs with the coxae, except apically, black; femora of hind legs dorsally black, except about the basal one-fourth, beneath with only the apical third black; hind tibiae with the apical half piceous brown, the rest yellow; apical joint of all tarsi dusky. Head, seen from above, about one and one-half times as wide as long, seen from in front, about one and one-third times as wide as long; front margin rounded, hind margin straight and finely carinate. Eyes and ocelli large, the latter in a triangle; lateral ocelli about as far apart as from the eyes and nearer than this to the occiput. Vertex rugose, with a large, deep, triangular depression in front of anterior ocellus from the apex of which a fine carina extends to the clypeus, the surface with scattered, short, erect, white hairs; the frons clothed with dense, silvery hairs; temples and cheeks smooth, separated from the eyes and occiput by fine carinae, and with a carina running from the eyes to base of mandibles. Antennae longer than head and thorax combined, with coarse pubescence; scape three times as long as wide; pedicel oval, about one-half times as long as scape; joint 3 one and one-half times as long as pedicel; joints 3–9 equal, two and one-half times as long as wide; apical joint one and one-third times as long as preceding joint. Thorax with scattered, erect hairs; pronotum short; mesonotum, scutellum and metanotum smooth and polished; the mesonotum with shallow punctures; mesonotum with traces of notauli anteriorly and with a fine carina running from the humeral angles to base of scutellum; scutellum separated from mesonotum and metanotum by deep, punctate foveae. Propodeum coarsely, reticulately rugose, the posterior face with two longitudinal carinae, enclosing an elongate, finely granulate area. Wings hyaline, with fine brown pubescence, subcostal nervure and stigma brown, the latter basally white; other nervures yellow; radius shorter than stigma, straight, obtusely angled near the apex. Abdomen smooth and polished, about as long as the thorax.

Length, 2.1–2.25 mm. *Expanse*, 3.75–4.2 mm.

Described from three specimens from Hollyburn, 10–27 June, 1928.

One paratype given to Mr. Robert M. Fouts.

SERPHIDAE.

***Disogmus*, Foerster.**

***Disogmus torvus*, new species.**

Female.—Black, polished; antennae brown; legs yellow, the tarsi bronhish; ovipositor dark brown. Head transverse, wider than the thorax, viewed from above one and three-quarters times as wide as long, with scattered pale

hairs; frons very feebly convex; ocelli in a triangle, lateral ocelli about as far apart as from the eyes and further apart than from anterior ocellus. Antennae coarsely pubescent, longer than head and thorax combined; scape robust; pedicel very short; joint 3 slightly more than twice as long as thick, somewhat longer than the following joint; joints 4-12 becoming gradually shorter and thicker; penultimate joint one and one-third times as long as thick, three-quarters as long as joint 3; apical joint three times as long as preceding joint, apex bluntly rounded. Thorax with the pronotal angles subacute; mesonotum convex; notauli distinct, posteriorly convergent; scutellum longer than wide, with a deep fovea at base; propodeum coarsely rugose, smooth basally, with three depressions at the extreme base, a distinct median carina running from the central depression and a lateral carina on each side connected posteriorly with the median carina by a transverse carina, the sides clothed with long, white, erect hairs. Longer spur of hind tibiae short, not more than one-quarter as long as the metatarsus. Wings faintly fumose; tegulae and venation brown; the stigma darker, elongate; radial cell as long as stigma; cubital, median, brachial, discoidal and basal nervures indicated by pale fuscous streaks. Abdomen polished, including the ovipositor about twice as long as thorax; beyond third tergite narrow and somewhat compressed; petiole a little wider than long, dorsally rugulose, laterally longitudinally striate; second tergite longitudinally striate at base, except in the centre, the striae shorter than the petiole, with a few hairs on the sides at the base. Ovipositor, cylindrical, very slightly curved, one and one-half times as long as hind metatarsus.

Length, 3.8 mm. (including ovipositor). *Expanse*, 4.5 mm.

Male.—Antennae and legs darker than in the female; antennae with the scape black, the flagellum dark brown; legs brownish-yellow, the tibiae paler. Antennae more slender than in the female; joint 3 longer than the scape, three times as long as thick, very slightly longer than joint 4; joints 4-12 subequal, penultimate joint very slightly shorter than joint 3; joints 6-8 with a slight, laminate, lateral expansion. Abdomen as long as thorax. In other respects agrees with the female.

Length, 3.0 mm. *Expanse*, 4.0 mm.

Described from two females and a single male taken at Chilliwack, B. C., 10, 14 and 31 May, 1927.

Paratype given to Mr. Robert M. Fouts.

SCELIONIDAE.

AMITUS Foerster.

Amitus arcturus, new species.

Female.—Black; scape dull yellow; flagellum brown, the club a little darker; forelegs pale brownish-yellow, the tarsi paler; middle and hind legs brown, the tarsi yellowish, apical joint of all tarsi dusky. Head with the frons delicately reticulate, vertex and occiput shagreened; viewed from above, two and one-quarter times as wide as long, front margin convex; rounded behind the eyes; the occiput emarginate, not distinctly separated from the vertex; ocelli in an almost straight line; lateral ocelli further apart than from the eyes.

Antennae with the scape two and three-quarters times as long as pedicel; pedicel three times as long as thick; joint 3 longer than pedicel and five times as long as thick; joints 4-7 gradually shorter and thicker; joint 7 one and two-thirds times as long as thick, half as long as joint 3; club one and one-half times as long as joint 3 and about three times as long as thick, the joints subequal, the sutures indistinct, oblique. Thorax wider than the head; pronotum very short; mesonotum rounded in front of tegulae, the hind margin straight; notauli distinct, posteriorly slightly widened and convergent; median portion of mesonotum slightly depressed, except anteriorly, the depressed portion smooth and polished, the anterior portion and also the lateral lobes (except the extreme hinder part) with delicate sculpture. Scutellum wider than long, posteriorly rounded, the surface finely shagreened, laterally with a few pale hairs. Propodeum invisible from above, except at the sides, which are clothed with dense white hairs. Pleurae smooth. Tegulae pale brown. Wings subhyaline. Abdomen slightly wider than thorax and very nearly as wide as long. First tergite short, longitudinally striate; second tergite wider than thorax, about one and one-half times as wide as long, with two large, longitudinally striate areas at the base, the striae extending to about the apical third, about twice as long as first tergite and longer than following segments combined; remaining segments smooth.

Length, 0.82 mm. *Expanse*, 2.17 mm.

Male.—Similar to female but legs and antennae slightly darker. Antennae longer than entire body; scape about four times as long as pedicel; pedicel one and three-quarter times as long as thick; joint 3 three times as long as thick and one and one-third times as long as pedicel; joint 4 about three times as long as thick and one and one-third times as long as joint 3; joints 5-9 gradually shorter and thicker, joint 9 one and one-half times as long as thick and about as long as pedicel; apical joint very nearly three times as long as thick and one and one-half times as long as joint 3.

Length, 0.85 mm. *Expanse*, 2.3 mm.

Variations.—The length varies from 0.75 mm. to 0.87 mm. There is considerable variation in the color of the antennae, one female having them almost black. The sculpture of the head varies to a slight degree, one female having a smooth area external to the lateral ocelli.

Described from one female taken 16 June, 1928, and twenty-one females and four males taken on various dates from 30 June to 17 September, 1929; all from Hollyburn, B. C., by sweeping Wild Cherry; associated with an Aleyrodid.

Paratypes sent to U. S. N. M., Dr. Ogloblin and Mr. R. M. Fouts.

CALLICERATIDÆ.

CALLICERAS Nees (= Ceraphron Jurine).

Calliceras concinna, new species.

Male.—A slender species, black and shining; femora and tibiae dark brown, the extremities paler; metatarsi of all legs yellowish-brown, rest of tarsi dusky.

Head, viewed from above, very nearly twice as wide as long, slightly wider than thorax; vertex very finely sculptured, with a depression before the front ocellus and a shallow, lunate depression exterior to the lateral ocelli and a longitudinal groove between them; facial depression smooth, very finely, transversely wrinkled medially; eyes nearly half their width from the occiput; ocelli in a triangle, much nearer together than to the eyes and occiput; lateral ocelli in front of hind margin of eyes; occiput narrowly produced backward in a very short collar. Antennae pubescent, slightly longer than thorax and abdomen combined; scape thickest in the basal half, very nearly as long as pedicel and joints 3 and 4 combined; joint 3 slightly longer than joint 4 and nearly three times as long as thick; joints 4-10 subequal, joint 10 only slightly shorter than joint 4; apical joint about one and one-quarter times as long as joint 3, pointed at tip. Mesonotum and scutellum finely and indefinitely sculptured, the latter somewhat reticulate on anterior half. Median groove of mesonotum shallow; hind margin of mesonotum emarginate. Frenum distinct, the lines meeting at base of scutellum, which does not quite reach posterior face of propodeum. Head, mesonotum and scutellum with very short, scattered pale hairs. Propodeum with the posterior face oblique, smooth and polished, lateral angles scarcely produced. Wings subhyaline, venation brown, radius curved, long, three times as long as the marginal vein. Abdomen slightly more than one and one-half times as long as thorax, highly polished, slightly compressed apically, base striate, with long whitish hairs at the sides. *Length*, 1.2 mm. *Expanse*, 2.1 mm.

Described from a single specimen taken at Hollyburn, 3 June, 1928.

***Calliceras boreale*, new species.**

Female.—A robust species, black, smooth, without evident sculpture, scape blackish-brown, apically pale; legs brown, femora darker, apex of femora and extremities of tibiae paler; tarsi pale brown, metatarsi yellowish-brown. Head one and three-quarter times as wide as long, scarcely wider than the thorax; vertex with a shallow depression before front ocellus, facial depression deep, smooth; eyes nearly reaching occiput, which is straight; ocelli in a triangle, as far apart as distant from the eyes and nearer than this to the occiput; lateral ocelli slightly in front of hind margin of eyes. Antennae short and stout subclavate, as long as head and thorax combined; scape obclavate, as long as pedicel and joints 3-6 combined; pedicel as long as joints 3 and 4 combined; joints 3 and 4 equal, subglobular; joints 5 and 6 slightly longer and thicker; joints 7-9 transverse, increasing slightly in length and considerably in width; apical joint conical, twice as long as thick, as long as three preceding joints combined; proximal joints of flagellum submoniliform, distal joints shortly petiolate. Mesonotum with the median groove fine. Scutellum convex, frenal lines distinct, fine, impunctate, uniting before reaching base of scutellum. Vertex, mesonotum and scutellum with regularly disposed, fine, whitish hairs which are denser on the sides of scutellum. Mesonotum with a conspicuous, laminate process in the centre with dense pale hairs. Dorsum and sides of propodeum and hind coxae posteriorly with conspicuous long, pale hairs. Wings subhyaline, venation brown, radius strongly

curved, one and one-half times as long as marginal vein. Abdomen as long as head and thorax combined, as wide as thorax and a little less than twice as long as wide, with a few, fine, very short, raised lines at the base.

Length, 1.0 mm. *Expanse*, 1.7 mm.

Described from two specimens from Hollyburn, 6 May and 17 September, 1928.

Paratype sent to Mr. R. M. Fouts.

LAGYNODES Foerster.

Lagynodes xanthus, new species.

Female.—Wingless, brownish-yellow, smooth and polished; eyes black; ocelli wanting; antennae yellow, the apical four joints brown; legs entirely yellow. Head subglobular, seen from above, about one and one-quarter times as wide as long; occiput emarginate; eyes their own length from occiput. Antennae about as long as abdomen; subclavate; scape half as long as rest of antenna, equal to joints 3-9 combined; pedicel twice as long as thick, nearly as long as joints 3-5 combined; joint 3 slightly longer than joint 4; joints 4-6 equal; joint 7 about one and one-half times as long as joint 6; joints 8-10 longer; apical joint nearly three times as long as preceding joint and nearly two and one-half times as long as thick; joints 3-6 increasing gradually in thickness; joint 7 considerably thicker than joint 6; joints 8-10 each thicker than the preceding joint; joints 3-6 submoniliform; joints 7-10 distinctly transverse, shortly petiolate, with the apical joint forming an elongate club. Pronotum a little more than two-thirds as wide as head, rounded in front, the sides almost straight, produced into a stout neck in front, hind margin very deeply emarginate. Mesonotum very short, not extending beyond the hind angles of the pronotum, hind margin emarginate. Metanotum very short, hind margin straight. Propodeum short, the sides straight, narrower than the mesonotum, about three times as wide as long, the hind margin sinuate. Pronotum about equal in length to the mesonotum and metanotum combined. Mesonotum and propodeum about equally long, the metanotum shorter. Petiole widely transverse, longitudinally striate. Abdomen large, conic-ovate, much wider than the head, about one and one-half times as long as head and thorax combined, second tergite constricted at base with short, indistinct striae. Head, thorax and abdomen with scattered, pale hairs.

Length, 1.2 mm.-1.4 mm.

Described from seven females taken at Hollyburn on various dates from 10 June to 17 September, 1928-29.

Paratypes sent to Mr. Robert M. Fouts and Dr. A. A. Ogloblin.

TRICHOSTERESIS Foerster.

Trichosteresis vitripennis, new species.

Female.—Black, smooth; legs with the coxae and trochanters black; femora brownish-black, except the extremities, which are paler; fore tibiae and tarsi brownish-yellow; middle and hind tibiae brownish-black, paler at the extremities; middle and hind tarsi brownish-yellow; apical joint of all tarsi dusky.

Head, pronotum, mesonotum and scutellum finely alutaceous, with a few, remote, shallow punctures, the head with short, scattered, white hairs; frons depressed above the base of antennae; ocelli in an obtuse-angled triangle, the lateral ocelli about as far apart as distant from the eyes; occiput with a fine, longitudinal, impressed line. Antennae black, third joint about one and one-half times as long as pedicel; joints 4-10 subequal, about three-quarters as long as joint 3 and slightly longer than thick; apical joint conical, slightly shorter than joint 3. Median longitudinal impressed line of the mesonotum deep, percurrent. Frenal lines punctate, meeting at base of scutellum. Wings hyaline, devoid of any pubescence and cilia; venation brown, the stigma darker; radius straight, shorter than the stigma. Abdomen polished, longitudinally striate at the base.

Length, 2.0 mm.-2.5 mm.

Described from three specimens taken at Chilliwack, May, 1926, and June, 1927.

Paratype sent to Mr. Robert M. Fouts.

This species differs from *T. floridanus* Ashmead in having the median line on the mesonotum complete, deeply impressed and in the darker color of the legs. In *T. floridanus* the median line on the mesonotum is not so deeply impressed and is entirely lacking on the posterior two-sevenths of the sclerite. In the original description of *floridanus* no mention is made of the extent of the median mesonotal line and for information on this point I am greatly indebted to Mr. R. M. Fouts, who kindly examined the type for me.

DIAPRIIDÆ.

PARATELOPSILUS, new genus.

Female.—Antennae 12-jointed; in other characters agreeing with *Atelopsilus* Kieffer.

Male.—Unknown.

Type, the following species:

Parateloopsilus canadensis, new species.

Female.—Head and thorax black; propodeum dark brown; antennae, legs and abdomen brown; wings faintly tinged with brown; venation brown, the marginal vein darker. Head, viewed from above, one and one-quarter times as wide as long; ocelli in a triangle, the lateral ocelli slightly in front of hind margin of eyes, about as far apart as distant from eyes and nearly twice this distance from occiput. Antennae somewhat longer than head and thorax combined; scape cylindrical; flagellar joints becoming moniliform distally; scape as long as joints 2-4 combined; pedicel and joint 3 equally long, two-fifths as long as scape, the pedicel thicker; joints 4-11 equal, about one-half times as long as joint 3; apical joint conic-ovate, a little less than three times as long as thick, and three times as long as penultimate joint and very slightly thicker. Mesonotum with distinct, deep, percurrent notauli; scutellum with a deep basal fovea; propodeum with a straight median carina, a lateral, obtuse-angled one, and a posterior transverse carina. Head and thorax smooth and polished, with scattered, long,

pale hairs, denser on the sides of propodeum. Forewings with the first abscissa of radius very short, not longer than its own width; cubitus indicated by an almost obsolete fuscous streak directed towards the brachial nervure; second abscissa of radius also almost obsolete, extending to margin of wing, enclosing a long narrow area; discoidal and brachial nervures present as very faint fuscous streaks. Abdomen fusiform, highly polished, with very long, scattered, pale hairs at the base and apex; petiole slightly wider than long, without carinae, front and hind margins, seen from above, feebly emarginate, the sides convex; second tergite with a few very short, longitudinal striae at the base; one and three quarters times as long as rest of abdomen. Third tergite one and one-half times as long as the fourth tergite, which is slightly longer than the fifth; sixth tergite as long as the third; seventh (last) tergite nearly three times as long as the third, conical, curved downwards.

Length, 2.0 mm.-2.5 mm. *Expanse*, 3.5 mm.-4.5 mm.

Described from six specimens taken at Chilliwack; one 9 Sept., 1926, the rest 30 May, to 10 June, 1927.

Paratypes sent to U. S. N. M. and Mr. Robert M. Fouts.

DIPHORA Foerster.

Diphora nearctica, new species.

Female.—Black; scape and pedicel yellowish-brown; flagellum brown; legs, including coxae, yellowish-brown; wings subfuscous, venation and tegulae brown. Head, viewed from above, about one and one-half times as wide as long; ocelli in a triangle, lateral ocelli as far apart as distant from eyes. Antennae with scattered, long, suberect pubescence, beyond joint 3 submoniliform; scape a little thicker than flagellum, as long as joints 3 and 4 combined; pedicel one-quarter as long as scape; joint 3 as long as following six and a half joints combined; following joints subequal, gradually a little longer and thicker; joints 13 and 14 about one and one-half times as long as joints 4-6; apical joint conic-ovate, one and one-half times as long as penultimate joint. Notauli deep, percurrent; scutellum with a deep basal fovea. Propodeum with some irregular punctures and carinae dorsally and with a distinct median, longitudinal carina. Head and thorax smooth and shining, with scattered pale hairs. Wings with the marginal nervure very short, first abscissa of radius oblique, marginal cell closed, large. Petiole longitudinally carinate, one and one-quarter times as long as wide. Abdomen polished, as long as head and thorax combined; second tergite one and three-fifths times as long as wide, more than twice as long as rest of abdomen, basally shortly striate, the median groove deeper and longer than the others, extending one-quarter the length of the tergite; third tergite about one-quarter as long as second tergite and nearly twice as long as the following segments combined.

Length, 2.0 mm.-2.5 mm. *Expanse*, 4.0 mm.-4.3 mm.

Male.—Similar to female.

Described from eight males and two females taken at Hollyburn on various dates between 11 June and 2 October, 1928-29.

Paratypes sent to U. S. N. M., Mr. Robert M. Fouts and Dr. A. A. Ogloblin.

ACROPIESTA Foerster.

Acropiesta pulchella, new species.

Female.—Head, thorax and petiole black, shining; antennae pale brown, darker distally; legs, including coxae, pale brown; abdomen reddish-brown; wings faintly tinged with brown, venation and tegulae brown. Head transverse; ocelli in an obtuse-angled triangle, lateral ocelli somewhat nearer together than to the eyes. Antennae slender, about three-fifths the length of the entire body; scape a little thicker than the basal flagellar joints, slightly thickened at apex, six times as long as its apical width, nearly three times as long as joint 3; pedicel oval, one and one-half times as long as thick; joint 3 three times as long as thick; joints 4-14 very gradually shorter and thicker, joint 14 twice as long as thick; apical joint one and three-quarters times as long as the penultimate joint. Pronotum invisible from above except at the humeral angles. Mesonotum with deep, percurrent notauli, the median lobe narrowed posteriorly. Scutellum convex, the basal fovea shallow in front, deeper behind. Propodeum with the hind angles produced, the hind margin emarginate and carinate, with a lateral carina and a distinct median carina which consists of two fine carinae (vide variation infra), the surface polished but slightly uneven. Pleurae smooth. Wings with the marginal nervure about two-fifths as long as the radial cell, the cubitus straight, directed towards the basal nervure. Petiole as wide as long, the front margin feebly emarginate, the front angles acute, hind margin straight, wider than the front margin, sides strongly convex, at the extreme base concave, the surface smooth but uneven, with two longitudinal carinae visible from above. Head, thorax, propodeum and petiole with scattered pale hairs, longer and denser on the sides of propodeum and petiole. Abdomen elongate-fusiform, highly polished; second tergite with a long, deep, median groove at the base, longer than the rest of the abdomen, twice as long as wide, widest about one-quarter its length from the hind margin; third to sixth tergites gradually longer, seventh tergite (last) one and one-third times as long as preceding four combined, somewhat compressed, the dorsum arcuate, three times as long as its basal width.

Length, 5.0 mm. *Expanse*, 7.5 mm.

Male.—Antennae slender, filiform, nearly as long as the entire body; scape four times as long as thick; pedicel globular; joint 3 as long as scape, the basal third deeply excised; joint 4 three-quarters as long as joint 3, four times as long as thick; following joints to joint 13 gradually shorter; joint 13 two-thirds as long as joint four; apical joint as long as joint four. Petiole about twice as long as wide. Abdomen elongate-oval, one and three-quarter times as long as wide; second tergite three and one-half times as long as rest of abdomen. In other respects similar to female.

Length, 4.0 mm. *Expanse*, 7.4 mm.

Described from five females and twelve males, taken at Hollyburn on various dates from 28 April to 8 September, 1928-29.

Paratypes sent to U. S. N. M., Dr. A. A. Ogloblin and Mr. Robert M. Fouts.

Variation.—One female measures only 4.3 mm. and has the last abdominal segment proportionately shorter, the petiole a little longer than wide. The male varies in length from 3.5 mm.—4.25 mm., and in one specimen the petiole is blackish-brown. In both sexes the median carina varies considerably and it may consist of two straight parallel carinae, two sinuous subparallel carinae, two strongly posteriorly divergent carinae, or two carinae that diverge from the base of propodeum. In life the color is brighter than described, the abdomen being a beautiful red. The species is very variable in color, the following well-marked forms occurring:

a. Var. melanocephala.—Differs from the typical form in having the entire body reddish-brown, only the head being black.

Hollyburn; one female and three males, 5–13 September, 1928–29.

b. Var. rufifrons.—Entirely reddish-brown, except the vertex and occiput which are black.

Hollyburn, one female and ten males, 2–16 September, 1928–29.

c. Var. rufa.—Entirely reddish-brown, only the eyes and ocelli black, and only the distal four or five antennal joints brown.

Hollyburn, two males, September, 1928–29.

A NEW BITING LOUSE (MALLOPHAGA) FROM WHITE-TAILED DEER.

BY HAROLD S. PETERS, *Bureau of Entomology, U. S. Department of Agriculture.*

Tricholipeurus virginianus,¹ n. sp.

A new species of Mallophaga of the family Trichodectidae has been taken from two white-tailed deer of the United States. It is described herein from three lots of specimens from the Virginia white-tailed deer, *Odocoileus virginianus virginianus* (Boddaert) as follows: 3 males and 2 females collected in Center County, Pennsylvania, on March 28, 1930, by Vernon Bailey (Bishopp No. 13806); 4 males and 13 females collected in Pike County, Pennsylvania, on March 30, 1930, by Vernon Bailey (Bishopp No. 13805); and 28 males and 7 females collected at State College, Pennsylvania, on April 28, 1930, by E. B. Forbes (Bishopp No. 13870). Three lots of specimens of this species were also at hand from the Texas white-tailed deer, *Odocoileus virginianus texanus* (Mearns), as follows: 13 males and 11 females collected in Maverick County, Texas, on December 29, 1915, by J. D. Mitchell (Bishopp No. 5446); 21 males and 29 females collected in Maverick County, Texas, on December 30, 1915, by J. D. Mitchell (Bishopp No. 5447); and

¹The genus *Tricholipeurus* was established by G. A. H. Bedford (in 15th Ann. Rept. of Dir. Vet. Services, Union of South Africa, Pretoria, October, 1929) for those lice on antelopes and deer as differentiated from those on porcupines, formerly all being included in *Eutrichophilus* Mjöberg (Arkiv. f. Zool. Band 6, No. 13, 1910).

6 males and 7 females collected at Sonora, Texas, on November 27, 1922, by O. G. Babcock (Bishopp No. 10677).

This new species is closely related to *Tricholipeurus mazama* (Stobbe) which was described from "Cervus mexicana," now known as Coues' white-tailed deer, *Odocoileus couesi* (Gmelin), from Mexico. However, *mazama* is a more slender species than *virginianus* and evidently has the sensory pits on the third segment of the antennae distinctly separated whereas they overlap in *virginianus*. This species is also close to *T. tibialis* (Piaget) and *T. odocoilei* (McGregor). The former species was described from a "black-tailed deer" and is much smaller, has different male genitalia and antennae, and has a dark spot before each abdominal spiracle. The latter species was described from a white-tailed deer, *Odocoileus virginianus macrourus* (Rafinesque), from Montana and is much smaller than *T. virginianus*. *T. parallelus* (Osborn) is very much smaller and has prominent dark spots before the abdominal spiracles and very different male genitalia and antennae.

Description of MALE. Head (Fig. 1) wider than long, much wider across forehead than across temples, truncate anteriorly with a wide shallow emargination and produced laterally into the trabecula-like process just before the antennae. True trabeculae not present. Antennal sinuses deep, for attachment of greatly enlarged first antennal segment. Ocular projections rather large, extending to extreme margin of temples which are smoothly rounded and meet the slightly concave occipital margin without an angle. Antennal bands narrow, widening at the front of the head into two plates separated by a narrow median clear space. Occipital bands elongate, almost parallel, being only

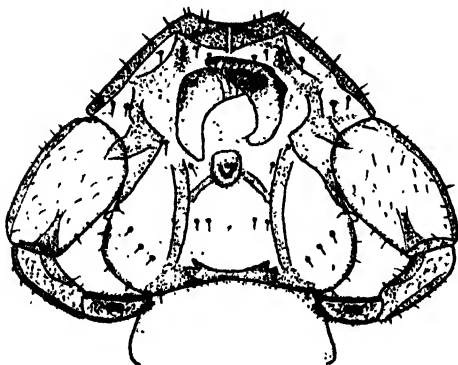


Fig. 1. Head of male, dorsal, X65.

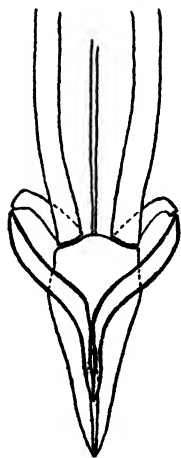


Fig. 2. Genitalia of male, dorsal, X125.

slightly curved. Occiput with a paired forked chitination on posterior border. Esophageal sclerite present. Two short hairs occur on each side of concave front, two just posterior to each frontal angle, three along outer margin of antennal bands, two very close together just anterior to the trabecula-like process, five on temple, eight in irregular row anterior to mandibles, two before base of antennae, two between base of antennae and esophageal sclerite, a row of four (in two pairs) between esophageal sclerite and occipital margin, and a diagonal row of four from a position anterior to base of ocular projection toward the occipital margin. Antennae large and backward pointing, reaching, if extended, to well beyond the prothorax. First segment greatly enlarged and practically as long as the second and third combined. Second segment longer than the third, both being slightly curved. All three segments have numerous short, hair-like spines; the third segment has three spine-like tubercles at the distal end and a mass of short spines on the opposite side, and has two sensory pits which are somewhat triangular in shape, the distal one overlapping the other.

Thorax one and one-half times as wide as long. Prothorax roughly rectangular in shape with straight posterior margin and with a conspicuous spiracle projecting from each lateral margin. There is a weak spine just before each spiracle, a similar one at each posterior lateral angle, two small hairs near the middle of the segment, and a transverse row of about twelve near the posterior margin. Pterothorax roughly trapezoidal in shape, wider than the prothorax, a group of several spines near each posterior lateral angle and an irregular row of about twenty small hairs near the straight posterior margin. Legs normal, with numerous short spines.

Abdomen elongate oval in shape, widest across the third segment although the fourth segment is almost as wide. Segments one to seven inclusive with a brown transverse band and a transverse row of short hairs on both the dorsal and ventral surfaces. Sutures uncolored. The spiracles on segments two to seven inclusive are situated in the golden brown lateral margin, there being no dark spot anterior to them. Segment eight has a row of rather long pustulated hairs along the dorsal posterior margin and the apical segment has a number of short spines. Genitalia conspicuous (Fig. 2), the basal plate consisting of two chitinous bars reaching into the fifth segment; the parameres are long, tapered and free distally, being fused at their base, and overlaid with a two-pronged dorsal chitination.

Description of FEMALE. *Head* as in the male except that the hind head is wider, the ocular projection larger, extending slightly beyond the margin of the temples, and the antennal sinus is much more shallow. Trabeculae present but not movable. First segment of the antennae only slightly swollen and shorter than either the second or third, the second segment being slightly longer than the third. Sensory pits on the third segment overlap as on the male antennae.

Thorax and legs as in the male except that the thorax is shorter and wider.

Abdomen oval in shape, slightly longer and wider than in the male. Segment eight with transverse row of six pustulated hairs, the outer ones three times as long as the inner four. Apical segment bilobed with three hairs on each lobe. Venter (Fig. 3) very distinct. Gonapods with combs of long spines and attached

to the movable tergites. A characteristic bilobed (with sharp points) chitinized plate in the center of the apical segment.

Measurements of specimens in mm.

	From <i>O. v. virginianus</i>		From <i>O. v. texanus</i>	
	Average of 35 ♂	Average of 22 ♀	Average of 25 ♂	Average of 30 ♀
Head				
Length.....	.514	.512	.532	.529
Width across Trabeculae.....	.561	.546	.570	.547
Width across Temples.....	.481	.524	.480	.515
Thorax				
Length.....	.307	.289	.298	.271
Prothorax, width.....	.377	.393	.373	.378
Pterothorax, width.....	.459	.487	.465	.481
Abdomen				
Length.....	1.483	1.546	1.571	1.642
Width, Segment III.....	.651	.771	.638	.739
Total length	2.306	2.347	2.401	2.443

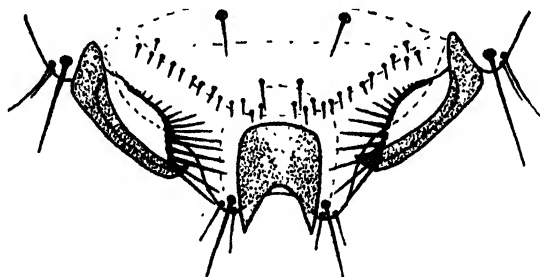


Fig. 3. Apical segment of female, ventral, X65.

It will be noticed that the specimens from *O. v. texanus* are longer and more slender (except head at trabeculae), but since there are no other evident differences between these and the specimens from *O. v. virginianus* I do not desire at this time to distinguish between them.

Type Host.—*Odocoileus virginianus virginianus* (Boddaert).

Type Locality.—Pike County, Pennsylvania.

Type Slide.—Cat. No. 43089, U. S. N. M.

The holotype male and allotype female on the type slide were collected from the type host at the type locality on March 30, 1930, by Vernon Bailey (Bishopp No. 13805). The paratypes are in the collection of the Bureau of Entomology and in my personal collection.

NOTES ON SOME LOCAL BUTTERFLIES.

BY AUSTIN H. CLARK.

As would be expected, most of the local butterflies make their first appearance in the spring earlier than they do in Massachusetts. This is particularly true of all the species which hibernate as adults or as pupæ, and of the larger species generally. But among the smaller butterflies that hibernate as caterpillars there are some curious exceptions.

The most extraordinary of these exceptions is found in the case of the silvered bog fritillary (*Brenthis myrina*) which first appears at Beltsville a full month later than it does at Boston—and even at Ottawa much further north—and nearly six weeks later than it does at Albany. Furthermore, in this region it has only a single brood flying in midsummer instead of three broods as about Boston.

While the hovering skipper (*Poanes massasoit*) does not appear at Beltsville until about the first of July, in New England it is on the wing in the first half of June. Similarly, Leonard's skipper (*Hesperia leonardus*) also appears in Massachusetts more than two weeks in advance of its earliest appearance in the District area in early September.

The goggle-eye (*Cercyonis alope*) is first seen, as casual individuals, somewhat earlier here than about Boston, but the main emergence takes place here about a week later than at Boston.

The grass-nymph (*Satyrodes eurydice*) first appears at Beltsville a month earlier than it does in the vicinity of Boston, but its period of maximum abundance is approximately the same in both places—possibly slightly later here.

The season of both this butterfly and the wood-nymph (*Megisto cymela*) is much longer here than at Boston, occasional individuals being met with until nearly the end of September.

The late appearance of many District butterflies and the long season of others, as for instance the satyrids, possibly is correlated with the curious and unusual irregularities in the temperature in the spring, particularly the occurrence of hot spells during which the caterpillars, or a greater or lesser proportion of them, become lethargic and do not feed.

This conclusion is suggested by the curious fact that the two widely distributed satyrids (*Megisto cymela* and *Cercyonis alope*) always make their first appearance in low wet woods near cold streams and are not seen until later in the warmer and drier areas.

Another curious thing about certain District butterflies is that they first appear earlier if the spring is cold than they do if the spring is warm or is marked by severe hot spells. Thus in the unusually cool spring of 1930 *Dryas cybele*, *Euphydryas phaëton* and *Poanes zabulon* were on the wing at least a week

earlier than their usual first appearance as indicated by the earliest previous records, and all three were common before the time the first individuals had emerged in the year preceding.

The habits of quite a number of the butterflies in this region differ more or less from the habits of the same species further north. For instance in this area the two sexes of *Poanes hobomok* and of *P. zabulon* inhabit quite different localities. The males are found in damp glades in the woods and especially along grassy banks of woodland streams, while the females range widely over open fields. Both sexes are found together only along the borders of damp woods. Such a selective distribution of the sexes is frequent among butterflies in tropical regions. In New England, according to my experience, both sexes of these butterflies are found in the same territory, in open fields and meadows.

The males of *Poanes zabulon* in this area have the further peculiarity of usually keeping well above the ground, and they may sometimes be seen darting about in open woods as much as ten or fifteen feet above the ground. But they prefer to rest and sun themselves on leaves from two to five feet above the soil.

The species of *Erynnis* (*Thanaos*) are more generally distributed here than in New England. While occurring in the woods, the males of most of them are also common in open fields, and I have taken the females of *E. juvenalis* and *E. icelus* far from any woods. Summer and autumn individuals of *E. juvenalis* I have found only in fields, and it may be that this insect is one brooded in the woods, and partially two brooded in open country. In the late spring *E. icelus* is very common in, and quite characteristic of, the damp meadows west of Cabin John.

In very early spring before the trees have put forth leaves *Erynnis juvenalis* may frequently be seen flying in moth-like fashion about the upper branches of trees twenty feet or more above the ground, a habit which seems not to have been recorded.

The rapid increase in abundance of the orange clover butterfly (*Eurymus eurytheme*) within the past few years is very interesting.

It was mentioned as having been seen in the Department of Agriculture grounds on November 11, 1886, and this is the only early record. There is a single broken male from the District without date in the Schönborn collection. In view of the fact that Mr. Schönborn kept only very small series of perfect specimens this is excellent evidence that he considered it rare.

Previous to 1926 the earliest date of capture is September 6 (C. R. Ely), most of the captures being in the last half of September, and the greatest number of individuals reported in any one day being three.

In 1926 it was taken on August 27, and was frequent from early September until the middle of October. Fifteen or more could be seen in a day.

In 1927 it was exceedingly abundant from the middle of July until the end of the season.

In 1928 it was first taken on June 24, and was very common from the first of July onward.

In 1929 it appeared on May 12, and was seen constantly until the last week in May when it disappeared, reappearing early in the second week of June and flying until the end of the season. Its numbers were equal to those of common *E. philodice*.

In 1930 it was first noticed on April 27, and by May 4 both sexes were more numerous than the corresponding sexes of *E. philodice*.

From the available evidence, *Eurymus eurytheme* up to 1926 seems to have been an annual visitor to the District, a few individuals arriving in the late summer, and a few of the young of these reaching maturity in September. In the years succeeding, the visitors reached the District in larger numbers, and progressively earlier; but until 1929 this butterfly appears not to have passed the winter here. In 1929 for the first time individuals of the spring brood were taken which undoubtedly had passed the winter locally, and the butterfly has now become—though possibly only temporarily—an abundant permanent resident.

Three examples of white females slightly flushed with pink on the discal area of the fore wings and with yellow on the hind wings have been taken here. So far as I know no such females have been taken elsewhere. Considering the relative infrequency of white females, this represents a considerable proportion of them. It will be interesting to see whether this form persists or disappears.

A female of *Atrytonopsis hianna*, a butterfly hitherto not known from the District, was taken on June 2, 1929.

Experiments have been undertaken to determine the nature of the emanations from butterflies' wings which affect photographic plates in complete darkness. Twenty-six different species were investigated. It was found that the wings of butterflies which had been dead for thirty years would affect the plates. Films showed the same color values as plates, but were not so strongly affected. Thin cover glasses interposed between the wings and the plates completely obliterated the portion of the wings covered. Strips of a substance especially transparent to light of short wave lengths rendered the portion of the wing beneath them somewhat fainter than the uncovered portions, but all the details of the color pattern beneath the strips were clear and distinct as elsewhere. Therefore the phenomenon appears to be due to a faint luminosity consisting of light of very short wave length.

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SOME ANATOMICAL DETAILS OF THE PUPA OF THE ARCHAIC
TANYDERID DIPTERON *PROTOPLASA FITCHII*, O. S.

By G. C. CRAMPTON, Ph. D.

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In June, 1929, Dr. C. P. Alexander accompanied me to the Gaspé Peninsula, Quebec, where I had formerly encountered a swarm of males of the rare and primitive Tanyderid Dipteran, *Protoplasia fitchii*, O. S. (Can. Ent., 61, 1929, p. 70) and a few larvae of this interesting insect were captured in the sand at the bottom of the shallow water at the edge of the West Pabos River. Two of the mature larvae, placed in wet sand by Dr. Alexander, pupated; and one of these was allowed to emerge as an adult (female), while the other, which had transformed to a pupa (male) was killed and preserved in alcohol for study. Dr. Alexander has published a general account of the immature stages of *Protoplasia* (Proc. Linn. Soc. New South Wales, Vol. 55 for 1930); but the following discussion presents the more detailed features of the pupae, which were kindly turned over to me by Dr. Alexander for this purpose, before depositing them in the extensive collection of the immature stages of Dipterous insects in the possession of Dr. J. Speed Rogers. The anatomical details of the larvae of *Protoplasia* will be discussed in a later paper dealing with the larvae in my possession; and the immature stages of *Protoplasia* will be compared with those of other Holometabola, from the standpoint of phylogeny.

The anatomical details of the pupa of *Protoplasia* are best seen in the cast skin of the female pupa shown in Figs. 1, 3, 6, 10, 17, etc., since the pupal skin, being free of the concealing structures formerly contained within it, readily permits the tracing of the course of the fore and hind gut linings (*fg* of Fig. 6 and *h* of Fig. 10), the tracheal linings (*i* of Figs. 6, 10 and 17), the tentorial arms extending inward from the frontal pits labelled *fp* in Fig. 1, the basalar apodeme *bap* of Fig. 1, the posterior phragma *phr* of Fig. 6, and other internal structures; furthermore, the parts are readily moved about to uncover the underlying structures in the cast skin; and the dorsal splitting of the pupal skin likewise gives a hint of the meaning

of the median dorsal sutures found in the head and thoracic region of an adult insect. Thus, the mid-dorsal cleft labelled *mds* in Fig. 6, extending from the end of the phragma *phr* forward into the head region, evidently forms the coronal suture of the head region (*co* of Fig. 6) and the arms of the cleft labelled *fs* in Fig. 6, evidently form the frontal sutures—or at least the weakened areas of the integument along which the pupal skin splits cause the formation of the coronal and frontal sutures in the integument of adult insects.

HEAD STRUCTURES OF THE PUPA.—The fact that the cleavage of the pupal skin along the splits labelled *co* and *fs* in Fig. 6, corresponds to the coronal and frontal sutures of the adult head has already been mentioned. The structure labelled *fg* in Fig. 6, is the cut-off portion of the fore-gut lining, which is cast off when the adult emerges. The internal invaginations extending inward from the frontal pits labelled *fp* in Figs. 1 and 3, are the shed linings of the anterior tentorial arms. There are weakly developed internal strands of citin attached to the skull near the label *m* in Fig. 16, or the depressions mesad of the label *c* in Fig. 3, and it is possible that these may represent the anterior arms of the tentorium, while the internal structures attached to the pits labelled *fp* in Figs. 1 and 3 may represent the dorsal arms of the tentorium but the former are so feebly developed, that it is more probable that they are some secondary internal structures of the head, and the real anterior arms of the tentorium are the invaginations extending inward from the frontal pits *fp* of Figs. 1 and 3, as was mentioned above.

The head of a *Protoplasa* pupa bears a pair of well-developed frontal horns, or frontocornua labelled *fc* in Figs. 1, 3, 6, etc., which evidently correspond to the frontal horns *fc* of the *Eriocera* pupa (a Tipulid) shown in Fig. 2, which occurs in the same situations in which *Protoplasa* was found, and these horns may serve to protect the pupae in some way from the sand and small rocks of their habitat. Similarly, the three epistomal processes, or epistomacornua *esp* of *Protoplasa* (Figs. 1, 3, etc.) probably correspond to the pair of epistomal processes of *Eriocera esp* of Fig. 2). *Eriocera*, however, has another pair of frontal projections, the prefrontal horns, or prefrontocornua *pfc* of Fig. 2, which are not developed in *Protoplasa*, although there are some slight prominences in the head of the pupa of *Protoplasa* in this general region. Lateral epistomal setae are borne at the bases of the lateral epistomal processes *esp* of Fig. 1 of *Protoplasa* and frontocornual setae are borne on the frontal horns labelled *fc* in Figs. 1, 3, 6, etc., of *Protoplasa*.

Among the other seta-bearing protuberances of the head region may be mentioned the chalaza-like anterior and posterior parietal papilla or processes *apa* and *ppa* of Figs. 1 and 6, each

of which bears a seta, the anterior and posterior parietal setae. The preorbital-seta *po* of Fig. 3 is also borne on a slight protuberance, but the prefrontal seta *pf* of Fig. 1 is not borne on a protuberance. The sub-genal or genal process *c* of Figs. 1 and 3, which corresponds to the genal process of adult Mecoptera and certain Trichoptera, bears a pair of subgenal setae in the pupa of *Protoplasa*. The subgenal process *c* of Fig. 1 projects over a protuberance of the propleuron bearing the label *c* in Fig. 1 (i. e. the anterior protuberance of the propleural region *pl* of Fig. 1), and is situated near the angle of the maxillary palpus *mp* of Fig. 3, which lies over it normally, as in Fig. 16.

The postorbital process *r* of Figs. 1 and 6 does not bear a seta. It projects above the anterior pronotal process *x* of Figs. 1 and 6, and was apparently developed in connection with this process of the pronotum for aiding in the interlocking of the head and pronotal regions to prevent twisting of the head. The sur and subscapal processes above and below the scape of the antenna *ant* of Figs. 1 and 3, apparently serve the same purpose for the base of the antenna.

The antennae *ant* of Figs. 1, 3, and 6 are laid back over the orbital or ocular areas *e*, and the tips of the maxillary palpi lie upon them, although in such pupae as *Eriocera* (Fig. 2) the antennae *ant* lie over the maxillary palpi *mp*. The dotted area mesad of the scape *sca* in Fig. 3 is the region of the antennal socket in the adult insect. Below these areas are the prefrontal sutures indicated by dotted lines (to indicate that they are very faint) upon which are located the frontal pits *fp* or pits of the anterior arms of the tentorium. A study of other insects would indicate that the real frontal sutures are the weak areas along which the splitting labelled *fs* in Fig. 6 occurs, and the faint lines on which the frontal pits *fp* of Fig. 3 are situated would therefore represent the prefrontal rather than the frontal sutures. As was mentioned above, the pits labelled *fp* in Figs. 1 and 2 may not represent the pits of the anterior arms of the tentorium, but may represent the pits of the dorsal arms of the tentorium, while the slight depressions just below the tips of the lateral epistomal processes *esp* of Fig. 3 may represent the pits of the anterior arms of the tentorium, but the latter depressions are so very faint, and the internal protuberances which they mark, are so slightly developed, that it is more probable that the better developed internal processes marked by the frontal pits *fp* of Figs. 1 and 2, are the true anterior arms of the tentorium, since these are always better developed than the dorsal arms, which are frequently atrophied.

The parietal region *pa* of Fig. 6 extends forward to the frontal clefts *fs*, and the frontal region extends from the clefts *fs* of Fig. 6, either to the frontal pits *fp* of Fig. 3, or to the dotted line just above the label *esp* in Fig. 3, if the location of the

frontal pits *fp* are not accepted as the anterior limits of the frontal region. The postclypeal or epistomal region is probably the region which bears the label *esp* in Fig. 3, although this region may represent a prefrontal region, since these areas are not clearly defined by sutures in the Diptera, and there is no general agreement as to the exact boundaries of the regions in question. The anteclypeal region is probably fused with the labrum labelled *l* in Fig. 3, since there is no well demarked suture between the labium and the clypeal region (comprising the ante and postclypeus or epistoma).

The small and rather indistinct processes labelled *m* in Figs. 1 and 3 are probably the mandibles, which are visible only when the pupal skin is viewed from the side, and the lighting is just right, since the processes are colorless and transparent in the pupal skin. The processes labelled *g* in Figs. 1 and 3 are the galeae of the maxillae. These are usually but poorly developed in Dipterous pupae, but are quite readily seen in the pupa of *Protoplasa*. The maxillary palpi *mp* are porrect or bent upward in *Protoplasa*, while in other pupae (Fig. 2) they may be more "horizontal," and in still others they may be pendant, or "drooping" (i.e. directed downward).

The labial palpi *lp* of Figs. 1, 3, and 16, are worthy of special mention, since they have been the subject of much speculation and discussion in the Diptera. Most recent entomologists regard these as the paraglossae, but comparative anatomy clearly demonstrates that these are the true labial palpi in adult Diptera (Proc. Ent. Soc. Washington, 27, 1925, p. 68), and a comparison of the pupa of *Protoplasa* with a typical Lepidopterous pupa, such as the one shown in Fig. 4, leaves no possible cause for doubting that the labial palpi *lp* of *Protoplasa* (Fig. 3) could be anything else than the true labial palpi. Thus, the labial palpi *lp* of Fig. 4 (which have never been interpreted as anything else in Lepidoptera) are situated immediately below the labrum *l*, with the galeae *g* and mandibles *m* occupying exactly the same relative positions in Fig. 4 that they do in *Protoplasa* (Fig. 3), and if any one will compare the pupa of such a primitive Dipteran as *Protoplasa* (Fig. 3) with a typical Lepidopteron such as the one shown in Fig. 4, the homologies will be so self-evident that it will seem almost incredible that the labial palpi of Diptera could ever have been interpreted as anything else! The labial palpi *lp* of *Eriocera* (Fig. 2) are rather widely separated, and a prosternal process *psp* projects forward between the palpi, as is shown in Fig. 2.

THORACIC STRUCTURES OF THE PUPA.—In the prothoracic region, the pronotum is apparently divided into an antepnotum *apn* and postpronotum *ppn* (Figs. 1 and 6), as described

in the adult Nematocera in a paper published in Vol. 18, p. 49, of the Annals of the Ent. Soc. of America for 1925. The anterior pronotal region *apn* of Fig. 1, is separated from the posterior region *ppn* by such a pronounced cleft in the pupa of *Protoplasa* (Fig. 1), and the anterior region is so closely associated with the propleuron *pl*, that it is quite possible that the anterior region *apn* alone represents the pronotum, and the posterior region *ppn* would then represent an anterior region of the mesonotum; but until the matter has been investigated more thoroughly, the postpronotum *ppn* may be treated as the posterior region of the pronotum. The lateral lobe of the antepronotum *apn* (Fig. 1) bears an anterior process *x*, which projects under the postorbital process of the head labelled *r* in Fig. 1, and a posterior projection *v* of Figs. 1 and 6, which extends toward the breathing horns *t*. The breathing horns or trumpets *t* of Figs. 1 and 6 are usually spoken of as the pronotal breathing horns, and they are quite closely associated with the postpronotum *ppn* of Fig. 6, but I am inclined to consider that these breathing horns are mesothoracic in origin, because the first spiracle is mesothoracic in origin (embryologically), and forms just behind the base of the breathing horn *t*, as is shown in Fig. 6, where the intima of the trachea is labelled *i*.

The propleural region *pl* of Fig. 1 sends forward a projection, as does the prothoracic coxa *cx*, and the maxillary palpus (which is cut off in Fig. 1, but is shown in Fig. 3 where it bears the label *mp*) is laid back between these two processes. It was not possible to make out any details of the prosternal region of the pupa without damaging the specimens, which did not belong to me, so that this region has not been figured here. From a superficial examination, however, it would appear that there is no region in the pupa of *Protoplasa* corresponding to the raised prosternal region *psp* projecting upward between the labial palpi *lp* of the pupa of *Eriocera* shown in Fig. 2.

The fore legs of the pupa of *Protoplasa* are shown in a figure which has been used to illustrate another paper, but the fore leg of the cast skin of the pupa of *Protoplasa* is figured in Fig. 3, and illustrates the process of telescoping which occurs when the leg is withdrawn from the pupal skin at the time of the emergence of the adult insect. When the leg is withdrawn from the pupal skin, the trochanter and base of the femur *fe* of Fig. 3, are telescoped into the coxa *cx*, the base of the tibia *ti* is telescoped into the femur *fe* and the base of the basitarsus *bt* (or basal segment of the tarsus) is telescoped into the tibia *ti*. The other tarsal segments do not become telescoped when the leg is withdrawn.

The fact that the region *ppn* of Figs. 1 and 6 may belong to the mesonotum instead of to the pronotum, has already been mentioned, and since the region *ppn* is somewhat more closely

associated with the mesonotum than with the pronotum this lends weight to the view that the region *ppn* may be an anterior mesonotal area. In any case, it may be possible to regard the breathing horns *t* of Figs. 1 and 6, as mesothoracic structures which have migrated forward and have become secondarily associated with the posterior region of the pronotum. The region behind the area *ppn* of Figs. 1 and 6 is separated from the postpronotum *ppn* by a poorly defined transverse suture, and if the area *ppn* does not represent the true prescutum of the mesothorax, the mesothoracic prescutum is included in the area just back of the region *ppn* of Figs. 1 and 6. At any rate, the region called the mesothoracic prescutum in the adult, is included in the area behind the region *ppn* of Figs. 1 and 6, but there is no line of demarcation between this prescutal region and the scutal region in the pupa, nor is the scutellum demarked in the pupa; but the postscutellar region *psl* of Figs. 1 and 6 is faintly demarked in the pupal skin, and bears the inward-projecting phragmal region *phr* of Fig. 6. It is possible that the anterior phragmal region is just behind the label *ppn* in Figs. 1 and 6 (i. e. the more clearly marked portion of the transverse line), but there is no indication of the anterior phragma in the median region of the back, since the mid-dorsal cleft *mds* (corresponding to the mid-dorsal suture of adult insects) extending forward from the hinder margin of the posterior phragma *phr* of Fig. 6 exposes no median shelf until the anterior region of the pronotum is reached (See Fig. 6). Laterally, however, the anterior phragma may be represented by the internal prominence just behind the label *ppn* of Fig. 6, if this really represents the anterior margin of the mesonotum, or it may be represented by the infolding just behind the label *v* in Fig. 6, if this represents the real anterior limits of the mesonotum. It is quite impossible to determine this point with the material at my disposal, and the decision in the matter must await further investigation.

The scutal region of the mesothorax of the pupa of *Protoplasa* bears the scutal setae labelled *sc* in Figs. 1, 5, and 6. In the pupa of the male, shown in Fig. 5, there are two anterior scutals and one posterior scutal on each side of the thorax, but in the cast skin of the female pupa shown in Fig. 6, and Fig. 1, one of the setae had either been broken off or was not developed. The tegular area *tg* of Fig. 1 bears three tegular setae in the cast skin of the female, but in the pupa of the male (Fig. 5) only two tegular setae *tg* were observed. The basalar or prealar lobe *ba* of Figs. 1, 5 and 6, bears three basalar setae *ba* in Fig. 6, but the anterior two basalar setae were so close together that they could be distinguished only with difficulty. A postpronotal seta borne on the region *ppn* just in front of the breathing trumpet *t* of Fig. 1 was observed in the pupal skin, but the

dorsal regions of the pro- and mesothorax were remarkably free of setae, in the pupa of *Protoplasa* and other Nematocerous pupae which I examined.

The mesothoracic wing-cases *f* of Figs. 1, 5, 6, etc., overlap the cases of the hind wings *ha* which enclose the halteres. The venation of the mesothoracic wing-cases has been figured by Dr. Alexander (l. c.), but at the time that this study was made, the venation had become practically invisible in the wing cases, due to the deterioration of the specimens. The structures at the base of the wings, however, could still be made out quite readily in the specimens, and are shown in Figs. 1 and 16. The tegular sclerite *tg* is fairly clearly demarked in the cast skin of the female (Fig. 1) and in the intact pupa of the male (Fig. 16); but the adanal sclerite *ad* of Fig. 16 was best seen in the male pupa, since the pupal skin had not been cast in this specimen, and the sclerotized adanal sclerite showed through quite clearly. The basalar apodeme did not show through the pupal skin of the male insect, but in the cast skin of the female pupa, the basalar apodeme *bap* of Fig. 1 showed through the transparent pupal skin very clearly. This basalar apodeme is an internal protuberance projecting inward from the basalar pit described in the adult of *Protoplasa* in Vol. 37, p. 35, of the Ent. News for 1926.

Just in front of the mesothoracic wing case is a flattened elevated prealar or basalar lobe labelled *ba* in Figs. 1, 2, 5 and 16. This lobe is well developed in many Dipterous pupae, but is not noticeably developed in the adults. It may serve to prevent a forward displacement of the wing case in the pupa, while the posterior process labelled *ph* in Fig. 6 may serve to prevent a dorsal displacement of the wing case.

The prehalteral lobe *ph* of Figs. 6, 5 and 16 may possibly be serially homologous with the basalar lobe of the mesothorax, labelled *ba* in figures. It bears a pair of prehalteral bristles labelled *ph* in Fig. 16, and Fig. 1. The metanotum *mn* of Fig. 16, Fig. 1, Fig. 5 and Fig. 6 likewise bears another pair of metanotal setae (i. e. the setae just below the label *mn* in Fig. 5). The metanotum *mn* of Fig. 1 is quite well developed in the pupa of *Protoplasa*, and is fairly well developed in many Tipulid pupae, but in the adults of most Nematocera except the Tanyderidae and Psychodidae it is usually greatly reduced.

ABDOMINAL STRUCTURES OF THE PUPA.—The areas of a typical abdominal segment are not easily seen in the male pupa, but in the pliant cast skin of the female shown in Fig. 17 the parts were more readily spread out to show the anterior areas of the tergite and sternite or dorsal and ventral region of the abdominal segment. The greater part of the ventral region of the fifth segment, its pleural region, and about one half (the

dextral half) of its tergal region are depicted in Fig. 17. The anterior tergal region labelled *at* in Figs. 17 and 10 apparently corresponds to the area termed the antetergite, and the anterior sternal region labelled *as* in Figs. 17 and 10 apparently corresponds to the area termed the antesternite in the abdomen of the roach described in Vol. 32, p. 195 of *Psyche* for 1925. In the first abdominal tergite shown in Fig. 6 an anterior region which is proportionately wider than the anterior region labelled *at* in Fig. 16, is demarked, but these two anterior tergal regions are not strictly homologous, since the anterior tergal region in Fig. 6 bears the two anterior tergal setae labelled *atg* in Fig. 6, while the antetergite *at* of Figs. 17 and 10 does not bear the anterior tergal setae, which apparently occur just behind the antetergite *at* in Figs. 17 and 10. At any rate, the anterior tergal setae labelled *atg* in Fig. 11 have been homologized with the anterior tergal setae labelled *atg* in Fig. 6 and 16 while the posterior tergomarginal setae labelled *pt* in Fig. 6 have been homologized with the posterior tergomarginal setae labelled *pt* in Figs. 17, 16, and 11. The anterior tergal setae are borne on small chalaza-like prominences, while the posterior tergomarginal setae are borne on a series of papilla-like protuberances. Processes of this description also occur in the pupae of *Eriocera*, *Ptychoptera* and other Nematocerous Diptera.

In the sternal region the posterosternal setae labelled *ps* in Figs. 17 and 11 are the best developed, and are likewise borne on chalaza-like or papilla-like protuberances, which are somewhat better developed in the sternal region of the seventh abdominal segment (i. e. *ps* of Fig. 9) which also bears a few weakly anterosternal setae labelled *ast* in Fig. 9.

The lateral or pleural region labelled *p* in Fig. 17 of the shed pupal skin of the female insect is better demarked in the pupa of the male shown in Fig. 11, where the pleural region *p* is indicated by a stippled area to show that the pleural region is slightly more "membranous" than the tergal or sternal regions, and the pleural region is also more projecting in the male pupa shown in Fig. 11 than it is in the pupal skin of the female shown in Figs. 10 and 17. The pleural region labelled *p* bears one anterior lateral and three posterior lateral setae in segments seven and five, shown in Figs. 17, 11, 9, etc., where the anterior lateral setae are labelled *al* and the posterior lateral setae are labelled *pl*. The anterior lateral setae are apparently more numerous in the first abdominal segment shown in Fig. 6, where the setae in question are labelled *al*.

The spiracles (which are apparently not functional in the pupal stages) are indicated by the labels *s* in Figs. 17, 10, etc., and are usually located in the anterior region of the pleurite, but the eighth abdominal spiracle labelled *s* in Figs. 10 and 11 is located in the posterior region of the eighth segment, just

above the base of the lateral process labelled *lp* in Figs. 10 and 11. The shed chitinous intima of the tracheae is labelled *i* in Figs. 10 and 17 of the pupal skin of the female, and these shed linings of the tracheae which remain attached to the region of the spiracle (labelled *s* in the figures) help to identify the location of these structures which are very small and difficult to detect.

The eighth and ninth abdominal segments in both male and female pupae, bear lateral processes labelled *lp* in Figs. 10, 11, 12, 9, 8 and 7; and the tenth segment bears the cerci, which are composed of a basal region or basicercus labelled *bc* and a distal region or disticercus labelled *dc* in Figs. 7 to 12 inclusive. This is of some interest, since the cerci appear to be borne on an eleventh (instead of the tenth) abdominal segment in some adult Diptera; but there appear to be only ten segments in the larval and pupal stages of these Diptera (the eleventh being a vestigial anus-bearing region) so that if ontogeny has any significance, it would appear to indicate that the cerci are appendages of the tenth segment, and not of the eleventh segment, as is the case also in adult Orthopteroids, etc.; but the embryologists claim that the cerci are appendages of the eleventh segment, and the question is still in dispute. In the pupa of the Mecopteron *Bittacus*, shown in Fig. 15, it would appear that the cerci (bearing the labels *bc* and *dc*) are appendages of the tenth segment, while the eleventh segment is represented by the anus-bearing terminal region *an*; but I have been unable to examine a pupa of *Panorpa*, which is a more primitive Mecopteron than *Bittacus*, to determine if the cerci are borne on the tenth abdominal segment in the more primitive representatives of the Mecoptera, which belong to an order of insects extremely like the ancestors of the Diptera. The shed lining of the hind-gut is labelled *h* in Fig. 10, and the lining of the hind-gut apparently extends to the region of the anus labelled *a* in Fig. 8, although it was impossible to determine the point of attachment of the of the hind-gut lining without injuring the delicate pupal skin. If the label *a* in Fig. 8 indicates the actual position of the anal opening, it is dorsal in position, as is also apparently the case in the pupal Mecopteron shown in Fig. 15, where the anus-bearing region is labelled *an*.

In the cast skin of the female pupa shown in Fig. 7, the papilla-like lobes labelled *v* lie on each side of what appears to be the location of the genital opening of the female. The lobes labelled *v* in Fig. 7 apparently lie in the ninth sternite, while the ventral vales labelled *vv* in Fig. 15 of a female pupa of the Mecopteron *Bittacus* seem to belong to the eighth abdominal segment, and project backward beneath the ninth segment. This suggests that the papillae labelled *v* in Fig. 7 might possibly represent the ventral valves *vv* of Fig. 15 which have

migrated into the region of the ninth segment in Fig. 7, but this explanation is not very convincing, and the valves of the female insects are not very similar in the pupae of *Protoplasa* and the Mecopteron shown in Fig. 15, although the cerci are quite similar in the two types of insects (i. e. they are composed of a basicercus *bc* and disticercus *dc*, as is shown by comparing Figs. 10 and 15) thus indicating that the Diptera and Mecoptera are more closely related than the genital lobes of the female pupae would indicate.

The genital claspers of the male of *Protoplasa* are represented by the pupal structures labelled *bs* and *ds* in Figs. 11 and 12, which are called the basistyles (*bs*) and dististyles (*ds*) in adult Diptera. The basistyles *bs* had long been interpreted as "pleurites" in Tipulidae, etc., but in his review of Alexander's "Craneflies of New York," Walker, 1920 (Canadian Entomologist, Vol. 52, p. 190) states that morphologically the basistyles *bs* are "undoubtedly coxites," and some Dipterists, such as Edwards and others, accept this view. From a comparison of the parts in male Diptera with those of lower Holometabola such as Tenthredinidae, Mecoptera, etc., the writer (Crampton, 1920, Psyche, Vol. 27, p. 34, and Crampton, 1923, Trans. Amer. Ent. Soc., Vol. 48, p. 207) concluded that the basistyle *bs* and dististyle *ds* represent the basal and distal segments of the genital stylus, while the coxite becomes reduced and united with the other parts in higher insects, such as the Diptera and other specialized forms. This interpretation was found to be the more probable one by Cole, 1927 (Proc. California Acad. Sciences, Vol. 16, p. 397) in his studies of the male genitalia throughout the order Diptera, and is the view accepted by most American Entomologists, but since the question is still a disputed one, the condition exhibited by the pupa of *Protoplasa*, which is one of the most primitive Diptera known, should be of some interest in this connection. As is shown in Figs. 11 and 12, there occurs at the base of each basistyle *bs* a rather poorly demarked area labelled *o* in Figs. 11 and 12, which apparently represents the reduced coxite bearing the two-segmented stylus (composed of the segments *bs* and *ds*). The areas labelled *o* in Figs. 11 and 12 correspond to the regions of the male genitalia interpreted as the coxites in adult mosquitos by Freeborn, 1924 (Amer. Jour. of Hygiene, Vol. 4, No. 3, p. 188); and a comparison with the genitalia of male Tenthredinid Hymenoptera, in which the sclerite representing the united coxites is distinctly separated from the two-segmented genital styli (whose segments correspond to the areas labelled *bs* and *ds* in Figs. 11 and 12) would indicate that the parts labelled *bs* and *ds* in Figs. 11 and 12 represent the basal and distal segments of the genital styli in *Protoplasa* also. The united coxites of the male genitalia are represented by a sclerite

which tends to become greatly reduced even in such primitive insects as the Ephemera, while in practically all Orthopteroid insects, which are extremely closely related to the ancestors of the Holometabola, the coxites of the male genitalia become reduced and fuse with the ninth sternite, so that unless we discard the fairly well established principle of the irreversibility of evolution (in which it is claimed that an organ once lost or reduced never becomes enlarged and well developed again), it hardly seems probable that the coxites which become reduced and fused with the ninth sternite in the forms like the ancestors of the Holometabola, would become hugely developed in the highest Holometabola (i. e. the Diptera) to form such large structure as those labelled *bs* in Figs. 11 and 12, which are interpreted as the coxites by some entomologists. It is therefore much more in harmony with the facts of comparative anatomy, and the observed evolutionary trends toward the reduction of the coxites in the forms nearest the ancestors of the Holometabola, to interpret the reduced areas labelled *o* in Figs. 11 and 12 as the coxites, and to interpret the parts labelled *bs* and *ds* in Figs. 11 and 12, as the segments of the genital styli, which are composed of several segments in most Ephemera, and are composed of two segments in the sawflies, which have retained the genitalia in as primitive a condition as any known Holometabola. This subject will be further discussed in a later paper treating of the pupal structures of the Holometabola in general.

ABBREVIATIONS.

<i>a</i>	Location of anus.
<i>ad</i>	Adanal sclerite or area.
<i>al</i>	Anterior lateral or pleural setae and seta-bearing processes.
<i>an</i>	Anal lobes or proctiger.
<i>ant</i>	Antennae or their cut-off basal portions.
<i>apa</i>	Anterior parietal setae and their processes.
<i>apn</i>	Anteprepronotum.
<i>as</i>	Antesternite.
<i>ast</i>	Anterior sternal setae.
<i>at</i>	Antetergite.
<i>atg</i>	Anterior tergal setae.
<i>ba</i>	Raised basalar or prealar area and setae.
<i>bc</i>	Basicercus (basal segment of cercus).
<i>bs</i>	Basistyle (coxite of some investigators).
<i>bt</i>	Basitarsus.
<i>c</i>	Genal or subgenal process and setae.
<i>co</i>	Coronal cleft marking position of coronal suture.
<i>cx</i>	Coxa.

<i>dc</i>	Disticercus (distal segment of cercus).
<i>ds</i>	Dististyle (entire stylus of some investigators).
<i>e</i>	Occular area.
<i>esp</i>	Epistomal processes and setae.
<i>f</i>	Fore wing cases.
<i>fc</i>	Frontocornua and setae.
<i>fe</i>	Femur.
<i>fg</i>	Fore-gut lining.
<i>fp</i>	Frontal pits.
<i>fs</i>	Frontal clefts corresponding to frontal sutures.
<i>g</i>	Galea.
<i>h</i>	Lining of hind-gut.
<i>ha</i>	Cases of hind wings or halteres.
<i>i</i>	Intima of tracheae.
<i>l</i>	Labrum.
<i>lp</i>	Labial palpi (in head region).
<i>lp</i>	Lateral processes in terminal abdominal region.
<i>m</i>	Mandibles.
<i>mds</i>	Middorsal cleft corresponding to middorsal suture.
<i>mn</i>	Metanotum and metanotal setae.
<i>mp</i>	Maxillary palpi.
<i>c</i>	Area representing coxites.
<i>p</i>	Pleural region (pleurite) of abdominal segments.
<i>pa</i>	Parietalia.
<i>pf</i>	Prefrontal setae.
<i>psc</i>	Prefrontal processes (Prefrontocornua).
<i>ph</i>	Prehalteral setae.
<i>phr</i>	Postphragma.
<i>pl</i>	Posterior lateral or pleural setae.
<i>po</i>	Preorbital or preocular setae.
<i>ppa</i>	Posterior parietal processes and setae.
<i>ppn</i>	Postpronotum.
<i>ps</i>	Posterior sternal processes and setae.
<i>psl</i>	Region of postscutellum.
<i>psp</i>	Prosternal prominence.
<i>pt</i>	Posterior tergal setae and processes.
<i>r</i>	Postorbital process.
<i>s</i>	Spiracle.
<i>sc</i>	Scutal setae and processes.
<i>sca</i>	Scape of antenna.
<i>t</i>	Breathing horns (spirotubae).
<i>tg</i>	Tegular region and setae.
<i>ti</i>	Tibia.
<i>v</i>	Ventral papillae (in abdomen).
<i>v</i>	Process of pronotum (in thorax).
<i>vv</i>	Ventrovalvulae.
<i>x</i>	Process of pronotum.

EXPLANATION OF PLATES

- Fig. 1. Lateral view of anterior region of the cast skin of the female pupa of *Protoplasa*.
- Fig. 2. Lateral view of anterior region of a pupa of *Eriocera*.
- Fig. 3. Frontal view of head, fore leg, etc., of the cast skin of the female pupa of *Protoplasa*.
- Fig. 4. Frontal view of head and fore leg of the pupa of a *Lepidopteron*, *Tinea* redrawn from Mosher.
- Fig. 5. Lateral view of the thoracic region of the male pupa of *Protoplasa*.
- Fig. 6. Dorsal view of the anterior region of the cast skin of the female pupa of *Protoplasa*.
- Fig. 7. Ventral view of the terminal abdominal structures of the cast skin of the female pupa of *Protoplasa*.
- Fig. 8. Dorsal view of the last abdominal segments of the cast skin of the female pupa of *Protoplasa*.
- Fig. 9. Dorsal view of the terminal abdominal structures of the male pupa of *Protoplasa*.
- Fig. 10. Lateral view of the terminal abdominal structures of the cast skin of the female pupa of *Protoplasa*.
- Fig. 11. Lateral view of the terminal abdominal structures of the male pupa of *Protoplasa*.
- Fig. 12. Ventral view of the terminal abdominal structures of the male pupa of *Protoplasa*.
- Fig. 13. Dorsal view of the fourth abdominal tergite of the pupa of the *Mecopteron Bittacus*.
- Fig. 14. Ventral view of the sixth abdominal sternite of the pupa of the *Mecopteron Bittacus*.
- Fig. 15. Lateral view of the terminal abdominal structures of the pupa of the *Mecopteron Bittacus*.
- Fig. 16. Lateral view of the anterior region of the male pupa of *Protoplasa*.
- Fig. 17. The right half of the fifth abdominal tergite, together with the pleurite and sternite of the female pupa of *Protoplasa* spread out in one plane.

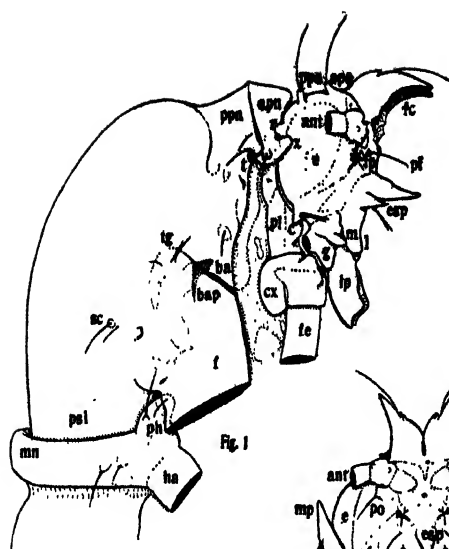


Fig. 1

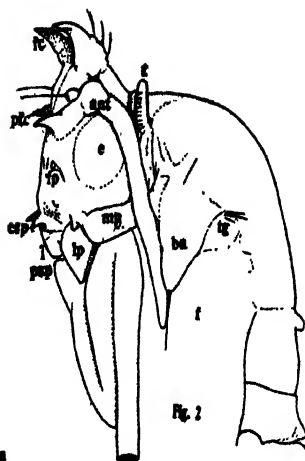


Fig. 2

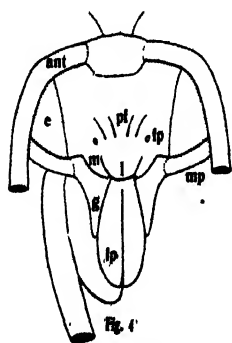


Fig. 4



Fig. 3

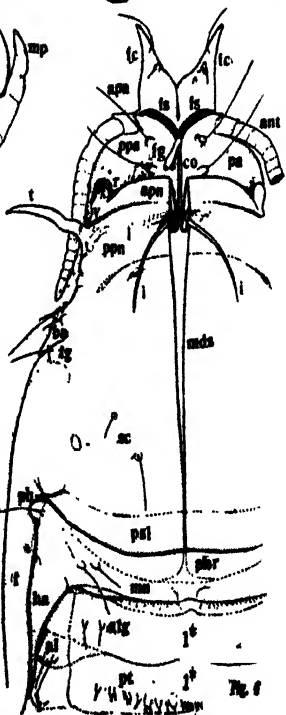


Fig. 6

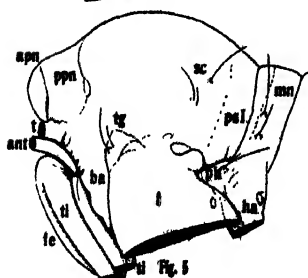


Fig. 5

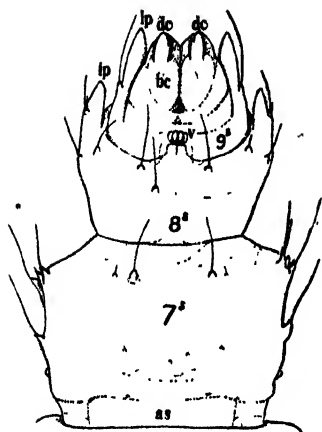


Fig. 7

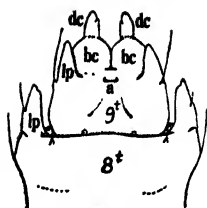


Fig. 8

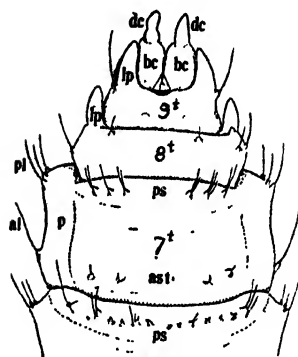


Fig. 9

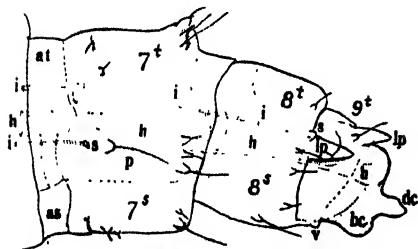


Fig. 10

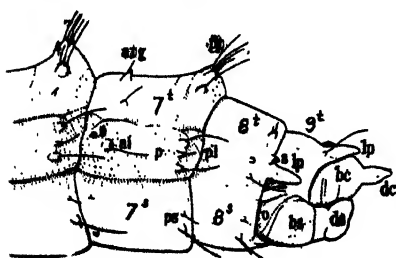


Fig. 11

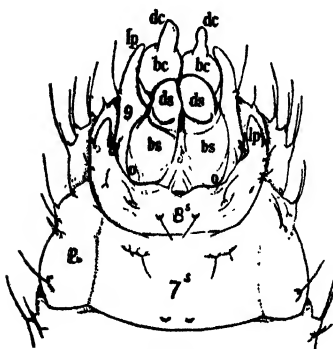


Fig. 12

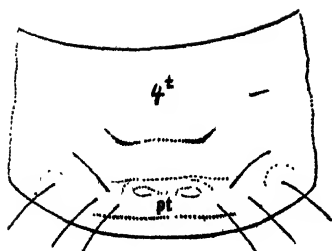


Fig. 13

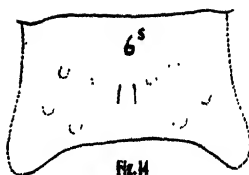


Fig. 14



Fig. 16

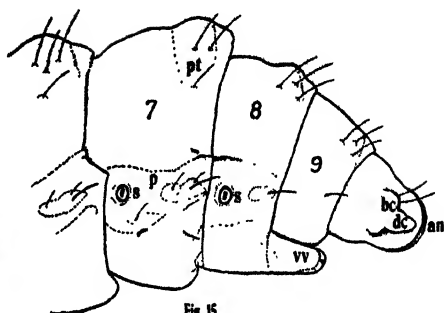


Fig. 15

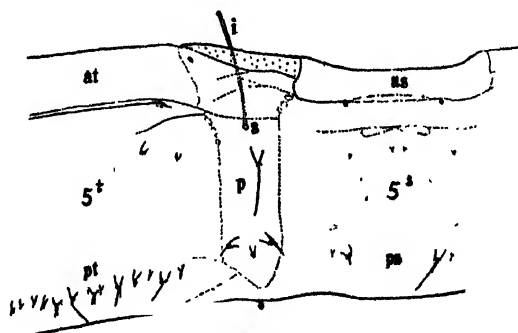


Fig. 17

THE SUGAR CANE INSECT PROBLEM IN NEGROS.

By W. DWIGHT PIERCE, PH. D.

For the past two and a half years the writer has been engaged in a study of the sugar cane insects of Occidental Negros, for the Victorias Milling Co., and the North Negros Sugar Company. These two companies operate in the northern sector of the Island of Negros, one of the Visayan group of the Philippine Islands.

The problem was of peculiar interest ecologically because of the evenness of the climate, which permitted the all-year continuation of all processes of sugar cane culture, and harvesting.

The mean temperature of the months November to March ranges from 78 to 80 degrees Fahrenheit, and for the months April to October ranges from 81 to 83 degrees. The total range of mean temperature is $5\frac{1}{2}$ degrees.

The mean humidity for March to June ranged 82 to 83%, July to October 84 to 87%, and November to February 87 to 88%. The total range of mean humidity was 6%.

Rain falls on an average of 200 days a year at Victorias, and the average fall is from 120 to 140 inches. This is so distributed that no month has a mean of less than ten rainy days, April having the least, and November the most. The rainfall is very irregular, but possible any day in the year. It is distributed differently from north to south, 20% falling at Fabrica in the northeast by the end of March, 40% by the middle of July, 60% by the middle of October, and 80% by the middle of November: but at Maa in the south, 20% has not fallen until the end of May, 40% by the middle of July, 60% by the tenth of August, and 80% by the end of September.

The sunshine varies from 90 to 230 hours per month, with the least in July and the most in May.

A large mass of data was collected and will be correlated with the climatic data in the hopes of finding definite growth correlations, even under conditions of as little variance as are shown here. With temperature and humidity more or less steady, sunshine and rainfall were the two principal variants.

As the problem was essentially economic, with time rather than money as the dominant control, it was necessary to so arrange the work as to arrive at essential economic steps at the earliest possible moment, subordinating the technical results to more deliberate after-study. Consequently many notes were made which will require considerable study as future time permits.

In order to properly gauge the progress of the work from month to month and obtain criteria for continuation, certain

field data were collected every month over the entire milling territory of the two companies, and frequently over the rest of the island. These were charted monthly and acted as business barometers. Thus we charted the percentage of dead heart infestation, the mean number of live and dead shoots per stool, the ratio of good to dead shoots, the difference in infestation in four parts of the territory, the percentage of top borer injury, the percentage of weevil borer injury in mature cane received at the mill, the percentages of parasitism of eggs and larvae of each species concerned, and from these points the probable saving due to parasitism. Two other ratios served a useful purpose. One was the average number of parasites per parasitized egg; the other, the ratio of total number of parasites to total host eggs. As the second ratio reached the first we were approaching maximum possible control.

These charts showed that if there had been no egg parasitism, the borers causing dead heart would have practically destroyed the entire crop in April, 1928, and October, 1929.

The average number of dead shoots per stool in January, 1928, was 2.4, and the ratio of good to dead 1.28. This rapidly diminished and after May, 1928, was always under 1.0 dead shoot per stool, with the ratio of good to dead always over 3.6. From February, 1929, the average dead shoots per stool remained under 0.65, and in August and September reached the low point of 0.25. The ratio stood over 5, and ran as high as 15, good shoots per dead.

The parasite distribution theory followed, was that a redistribution of parasites native to the country can effectively increase mean parasitism; that tiny parasites acting in the midst of a sufficiency of hosts do not normally spread far or rapidly, but by redistribution can be put to work in a far greater number of foci; that small numbers of parasites released at each focus will have the greatest opportunities for rapid development of numbers, because of unrestricted host supply; that a few parasites can be spared from fields where they are common and taken to fields where they are less common; that a larger number of planters can be satisfied that parasites are established and at work on their places by the starting of small colonies, and later returns with additional supplies; that a high mean parasitism can be built up by means of redistribution, drawing from the highest percentage zones and placing in the lowest percentage zones; that bringing parasites into newly planted fields at the very beginning of attack results in less damage than when the parasites are expected to find their way into the new fields. Naturally the various points in this theory developed as the work progressed, but all are thoroughly

justified by the results, which we hope to publish in detailed studies later. Just as an example let us take the mean parasitism of the eggs of the principal borer causing dead heart, *Olethreutes schistaceana*, for six month periods. For the six months September, 1927, to February, 1928, it was 19%, the same six months 1928-1929 it was 43% and the same six months 1929-1930, 79.5%

While this parasite redistribution was progressing it was also necessary to establish the idea of the importance of cultural measures to be taken by the planters themselves, and so in March, 1928, a Clean Culture System for sugar cane culture was announced, and in July, 1929, this was elaborated in a bulletin, the first in a series of six.

The main features of this system are as follows:

1. Sugar cane should not be ratooned when diseased with mosaic, Fiji disease, leaf scald, or root rot; or when the roots are badly attacked by root grubs or other serious root pests.
2. Planting stock should be selected from healthy fields, and points showing injuries should be discarded.
3. There should be inter-island regulation of the shipment of seed cane.
4. The cane should be stripped in the field, and the trash burned. This burning should be followed up with the collection of all unburned sticks, for a second complete burning.
5. Thorough cultivation is necessary for control of soil insects.
6. When a field is to be fallowed it should first be plowed, and should never be abandoned and left unplowed, for then the soil grubs can complete development.
7. Rotation of crops with legumes is desirable.
8. Choice of variety is important. The factors which govern susceptibility and immunity include rapidity of stooling, root growth, rapidity of stalk growth, hairiness of stalk, hardness of rind, fiber content, sweetness, and succulence of leaf.
9. The highest percentage of dead heart comes on cane that is young in February, and the least on young cane in May to July.
10. Points should be husked in one spot and the trash burned.
11. Rectification of soil conditions toward neutral, will reduce root grub attack.
12. Addition of potassium sulphate or lime will assist plants that have yellowed from root rot, nematodes, and other troubles, when low potash ratio is shown.

13. All weeds have a bearing upon the cane insect problem, and the grasses are the contributors of many diseases and pests. Consequently these should be eliminated as far as possible. Where grass is used to prevent erosion it sometimes brings about increase of mosaic. Substitution of sweet potatoes for grass as the binding crop is recommended. Certain plants serve as honey plants for the wasp parasites of the root grubs, and some of these should be encouraged, especially where they are useful as well.
14. In case of heavy dead heart infestation the shoots should be cut at base and burned.
15. Weevil damage can be reduced by removal of all waste pieces of stalk, and removal by burning of all banana and palm stumps. The weevils can be trapped by cut pieces of cane.
16. Turning of chickens and hogs into newly harvested fields will help control the root grubs. In bad infestations the laborers should be paid for collection of grubs and adults.
17. Traplights are very valuable for the control of the cane moths, which usually oviposit on the night they are found at the lights.

The main types of injury are dead heart of young cane, borers in mature cane, root grubs, juice suckers.

In January and February, 1928, over 30% of the stalks arriving at the mill were weevil infested. After May, 1929, this damage averaged under 15%. The mean calculated loss of sugar from an uninfested crop varied by variety from 10.8% to 21.8%.

The principal sugar cane insects on Negros are as follows:

Injuring seed cane in ground.

The Weevil—*Trochorrhopalus strangulatus* Gyllenhal.

The shot hole borer—*Xyleborus perforans* Woll.

Termites—*Macrotermes gilvus* Hagen.

Rind girdler larvae and beetles—*Eutochia lateralis* Heller.

Darkling beetles—*Opatrum acutangulum* Fairm. and *O. depressum* Fabr.

Injuring roots.

Mole cricket—*Gryllotalpa africana* Palis de Beauv.

Soil grubs, or "buc-an": *Leucopholis irrorata* Chev., *Anomala anoguttata* Burmeister, *Anomala humeralis* Burmeister, *Holotrichia vidua* Sharp.

Root louse—*Tetraneura lucifuga* Zehnt.

Mealy bug—*Trionymus sacchari* (Cockerell).

Root stink bugs—*Macroscytus transversus* Burm., and *Stibaropus molginus* Schiödte.

Nematodes—*Heterodera radiculicola* Greef Muller, and *Tylenchus similis*.

A Cicada larva, numerous Collembola, Lepismids, slugs, etc.

Causing abnormality of growth.

Topborer—*Topeutis intacta* Snell.

Breakage of leaves caused by *Perkinsiella vastatrix* Breddin, egg punctures; *Cosmopteryx dulcivora* Meyrick, midrib mines.

Tip tie caused by leaf rolling *Thrips*, leaf roller larvae of *Marasmia trapezalis* Gn., and *Padraona dara* Koll., nests of the ant *Polyrhachis diversus* in the leaves, and attack of the mite *Paratetranychus exsiccatus* Zehnt.

Injury to young cane.

Topborers—*Topeutis intacta* Snell, and *Topeutis auriflua* Zell. Dead heart or "tamasoc"—

Termites—*Coptotermes vastator* Light and *Microcerotermes los-banosensis*, Oshima.

Millipedes.

Adult beetles boring in—*Heteronychus morator* F. and *Eutochia lateralis* Boh.

Beetle larvae of *Eutochia lateralis* Boh.

Fly larvae of an Anthomyiad.

Moth larvae of *Olethreutes schistaceana* Snell., *Diatraea infuscatella* Snell., *Diatraea striatalis* Snell., *Sesamia inferens* Walker, *Sesamia uniformis* Dudgeon, *Siboga falsella* Snell., *Homona* sp., *Amata deflocca* Swinhoe.

Bud injury.

Bud worms—*Opogona dimidiatella* Zeller, *Ereunites* spp.

Rind girdler—*Eutochia lateralis* Heller.

Stalk borers, both moth and weevil.

Stalk borers.

Moth borers—*Olethreutes schistaceana* Snell. *Diatraea striatalis* Snell., *Sesamia inferens* Walker, *Sesamia uniformis* Dudgeon, *Diatraea infuscatellus* Snell.

Top borers—*Topeutis intacta* Snell, *Topeutis auriflua* Zell.

Weevil borer—*Trochorhopalus strangulatus* Gyll.

Shot hole borer—*Xyleborus perforans* Woll.

Stalk juice suckers.

Mealy bug—*Trionymus sacchari* (Cockerell).

Scale—*Aulacaspis tegalensis* (Zehnt.).

Leaf suckers.

Leaf hoppers—*Perkinsiella vastatrix* Breddin, *Proutista moesta* Westwood, *Lophops carinatus* Kirby, *Ricania taeniata*, *Ricania proxima* Mel.

White flies—*Aleurolobus barodensis* Maskell, *Aleurodes lactea* Zehnt., *Neomaskellia bergii* Sign.

Woolly aphid—*Oregma lanigera* Zehnt.

Aphids—*Aphis maidis* Fitch, *Aphis sacchari* Zehnt.

Scales—*Chionaspis depressa* Zehnt., *Chionaspis saccharifolii* Zehnt.

Thrips—*Thrips serrata* Zehnt., etc.

Mites—*Tetranychus exsiccator* Zehnt.

Leaf miners—

Topborer first larvae—*Topeutis intacta* Snell.Midrib miner—*Cosmopteryx dulcivora* Meyrick.Moth blade miner—*Cosmopteryx pallifasciella* Sn.Beetle blade miner—*Monochirus callicanthus* Bates.

Leaf eaters—

Army worms—*Spodoptera mauritia* Boisd., *Cirphis loreyi* Dup.Leaf rollers—*Marasmia trapezalis* Gn., *Padraona dara* Koll.Leaf worms—*Cyllo leda* L., *Dinara combusta* Moore, *Laelia suffusa* Walker, *Mycalasis mineus* L., *Parnara matthias* Fabricius, *Prodenia litura* Fabricius, *Utetheisa pulchella* L.

Many grasshoppers.

This list is only partial, as many injurious species are as yet undetermined. The majority of the determined species are recorded from Java, some from India, Australia, and other oriental countries. I have omitted the long list of beneficial insects.

DEPREDACTIONS TO LEAD-COVERED AERIAL CABLES BY BEETLES IN BRAZIL.

BY E. J. P. RENDELL,

*Empresas Electricas Brasileiras, S. A., Rio de Janeiro.*¹

Cases of damage to aerial telephone cables by lead boring insects have been reported from such varied parts of the world, as China, Australia and California—these matters have been

The present paper presents a unique case of insect damage to metal. The species studied in this country, a Bostrichid, *Scobicia declivis* Lec., attacks lead sheathed aerial cables in the adult stage, apparently stimulated in its attack by the contact stimulus, since most of the attack is at the point of contact of the cable and the ring which supports it. Injury has been prevented by changing the character of the ring cable and thus preventing the insect from propping itself in order to facilitate boring. Soft beef tallow placed on the cable will also prevent attack.

Apparently all damage to metal by insects is accidental. The insects either emerge from wood and continue to bore through metal which is in contact with the wood or haphazardly attack metal, being stimulated by some tropism. We believe that in the present case it can be likened to that of a female moth in captivity, laying her eggs by necessity on whatever object chances to be nearby, and it might be that the female beetle being full of eggs lays a few on the lead sheath cables, preserving the greater supply for the normal wood host plant.

Dr. L. O. Howard has handed me the first reference to a larva boring in lead which is as follows: Schirch, P. F., Un insecto que fura canos de chumbo, Bul. Nat. Mus. Brazil, vol. V, no. 3, p. 97-8, figs. 6, September, 1929. Rio de Janeiro.

May 16, '30.

THOS. E. SNYDER.

investigated by Government scientists whose findings are set forth in a bulletin issued by the Department of Agriculture, Washington, D. C.¹

Lead boring trouble exists in Brazil, and recognizing the extent and importance of the work already done by Dr. Thomas E. Snyder and his associates in Washington, Mr. Paul B. McKee, General Manager Empresas Electricas Brasileiras, S. A., commissioned the writer to co-ordinate all information which could be collected from the associated telephone companies operating in Brazil, for report to Dr. Snyder.

Amongst others—the operating engineers in the States of Pernambuco, Bahia and Espirito Santo, all report lead boring trouble, but as information to date is complete only in respect of Pernambuco, this history will deal principally with the investigations made on the Pernambuco beetle, *Megaderus stigma* L. Cerambycidae.

The Telephone Company of Pernambuco serving the automatic system of Recife has an aerial cable network of approximately 100 kilometers. The cables, varying in size from 10 to 200 pairs, are of standard dry core specification, plain lead sheath composed of 99% pure lead and 1% antimony. The cables are supported over the network with "Bonita" rings on steel suspender attached to steel poles.

The cables in the affected area, with a length of approximately 18.6 kilometers, were erected July–December, 1927. They were tested O. K. on air pressure and for insulation in January, 1928. In February, 1928, reports of low insulation were received, and the attempt to dry out by pumping dessicated air into the cables, disclosed the existence of small broadly oval shaped holes, approximately 1 mm. long, penetrating the upper half of the lead cable sheath;—the trouble recurred continuously in this area until June, 1928, when the reports ceased for that year. In February, 1929, however, more cases of cable breakdown were reported, and these continued until the month of July, 1929, after which no further trouble was experienced up to March, 1930.

Sometimes the cable breakdown would be caused by one hole only, but as many as 100 holes have been located in one 88-meter length of cable—80 of these holes were discovered in one 40-meter span—in all cases the dessicating pump proved to be invaluable in speedily locating the presence and position of the holes in the lead sheath.

It was observed that the holes appeared over the whole length of cable, irrespective of the position in the span or of

¹1923. Burke, H. E., Hartman, R. D., and Snyder, T. E., The lead-cable borer or "short-circuit beetle" in California, U. S. Dept. Agric. Bul. 1107. (Professional paper.)

cable rings or other supports;—the holes are always in a 45° sector on either side of the center in the upper half of the sheath—the boring is however generally not radial, indicating an attempt at tunnelling.

Close examination of other materials adjacent to the cable was made by the Lines Engineer, Mr. Seeley, who eventually discovered identical holes in cross arms of "Sucupira" wood. He also observed several small shell-like objects in clusters on the wood cross-arms, which could be removed by a slight touch—in some instances disclosing a white substance. Mr. Seeley afterwards observed similar objects on the cable sheath and after much patient watching he was rewarded by the capture of a beetle on the cable. It was subsequently found that these shell-like objects were really eggs, deposited by the beetle "*Megaderus stigma*," known colloquially in Recife as the "Carocha," a wood-boring beetle about one inch to 1½ inches long. The matter had been fully reported to Mr. Berry, Chief Engineer, and he, together with Mr. Seeley, commenced a series of observations on the bad habits of the "*Megaderus stigma*" family. It will of course be appreciated that the activities of "*Madame Meg*" during the egg season made it difficult for the observers to maintain 100% observations—which consequently were of necessity extended over a considerable period.

Several of the beetles were collected and placed inside a metal box with a glass top—pieces of lead cable were put inside the box and very soon eggs were deposited thereon.

In the first observation the box and contents was left on a table in a room, but after several weeks as no result was obtained the observation was abandoned.

Later more beetles were placed in the same box—but in this instance the conductors were withdrawn from the sheath and the ends sealed. Eggs were again deposited on the sheath which was then placed outside in similar conditions to the cable in the network.

In six days holes were found in the lead, empty shells noticed over some holes and around others minute lead borings were visible. Some of the eggs were lying on the sheath, having the same appearance as when deposited.

After a further period of 14 days more holes were discovered in the lead sheath, and the sheath was then opened.

No trace of any object of any description was discovered inside the sealed sheath. These observations extended to July, 1929—and by that date the beetles having disappeared no more eggs could be obtained. Summarizing the results of these observations Mr. Berry states:

- (a) The insect is the *Megaderus stigma*, L. (Cerambycidae),



Section of lead telephone cable showing eggs of *M. stigma*
and holes made by larvae.

- (b) The hole is bored by the larvae and not by the full grown insect,
- (c) The egg can develop and a hole be bored in the lead sheath in 6 days,
- (d) Apparently the limit of damage directly accomplished by the borer is the boring of the lead sheath. The insulation of the cable is not damaged by the insect but by the moisture which passes through the hole,
- (e) There is a tendency to tunnel on the part of the insect.

It was felt that some confirmation of Mr. Berry's conclusions was desirable, particularly as the larvae had not been seen by the observers and the writer arranged for a consignment of live male and female beetles to be despatched by airmail to Dr. Raymond C. Shannon, who is at present residing in Bahia.

A full report of the observations made in Pernambuco, and a consignment of live beetles were also sent to Doctor Carlos Moreira, Director of the Instituto Biologico, Rio de Janeiro. Dr. Moreira is keenly interested in the lead-boring problem and he is taking steps to advance these investigations, the result of which will undoubtedly take the form of a separate and most interesting report. In the meantime, Doctor Shannon has arrived at some conclusions and the following is a verbatim account of his report on his findings:

Some observations on the Lead Boring Beetles, March 4th to March 13th, 1930.

A shipment of beetles, received from Recife March 4th, consisted of a wooden box, the top being sealed with a fine mesh copper screening, and contained 10 living male and female beetles *Megaderus stigma*, L. (Cerambycidae), and an eight-inch piece of lead pipe.

The following observations were made:

1. Incubation period of the eggs—minimum, 4 days; maximum, more than 9 days.
2. Of the 27 eggs which had been deposited on the lead, 7 of the larvae upon hatching succeeded in boring through the lead; 12 attempted to do so but gave it up and crawled out of a hole made on the free side of the egg and fell to the bottom of the container; the rest apparently died before hatching.
3. The boring is accomplished by chewing the hole with the jaws, i.e., it is a mechanical and not a chemical action.
4. Little if any of the lead is ingested (therefore the boring larvae are not poisoned by the metal).
5. Free larvae (those lying loose on the bottom of the container) when placed in a damp cardboard box were unable to bore into the cardboard.
6. Larvae hatching from the eggs laid on the fine mesh copper screening of the top of the box, made little or no attempt to bore; possibly the copper is too resistant.

7. Larvae succeeding in boring through the lead cable doubtlessly die shortly afterwards owing to lack of food and water.
8. The larvae upon hatching are small (about 2 mm. in length) grub-like, creamy yellow in color and entirely soft, save for their strongly sclerotized cutting jaws.
9. The mandible is flat, the basal attachment being very broad, while the anterior or outer edge is developed into a sharp blade-like structure, which resembles the curved edge of a circular blade. Below the blade-like structure is a more or less distinctly separated gouge-like organ, pointed at the apex and with a hollow between two lateral sharp edges. Presumably the blade-like structure of the main part of the mandible is pressed into the lead, forming a groove, while the attached gouge-shaped structure is used in chipping off the lead along the sides of the groove.
10. The lead is ejected from the boring by a twisting, backward movement of the larva. As a piece of the lead is removed by the mandibles, the labium holds it in position, while the larva twists its body so as to free its head in order to carry the bit of metal to the opening of the boring. This is piled into the egg case, and as it is filled, the shavings begin to fall out of the (sometimes two) opening which has been previously made on the free side of the egg shell.
11. The various dimensions are:
 Egg: $1\frac{1}{2}$ mm.
 Larva (first stage) approximately 2 mm.
 Adult beetle from 30 to 40 mm.
 The appearance of the larva and adult beetle *Megaderus stigma* is illustrated in attached drawing.

The following life story is also from the pen of Dr. Shannon:

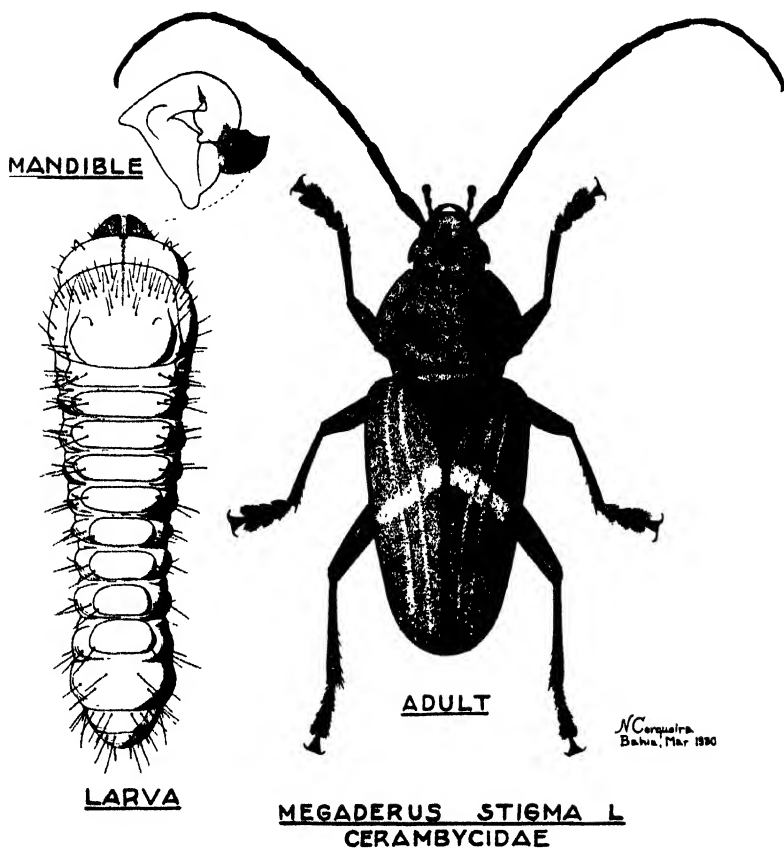
The Probable Life-History of the Beetle in its Normal Habitat.

The proper food material of the larvae undoubtedly is wood. The fact that the beetles sometimes lay their eggs on metal surfaces, indicates nothing more than a mere accident (as far as the beetle is concerned). It would be of interest and probably of importance to ascertain the preferred type of wood, especially whether it is a living tree or dead and dry timber (very probably the latter).

The egg requires at least four days to hatch but may remain unhatched for more than nine days.

The larva upon hatching immediately bores into the surface to which the egg is attached, using the egg shell as a support or brace until it is well within its gallery. In its natural habitat (wood) it probably retains the larvae stage for six months to nearly a year. After the larvae attains its growth, it transforms into the pupa (probably only one or two weeks is required for this stage) and finally, upon the arrival of the proper season for the adults, they, the adults, make their exit from the wood.

The proper season for the adults probably corresponds more or less to the summer season. The length of life of an individual adult may be from one to three months.



The length of life per individual (all stages, egg, larva, pupa and adult) probably approximates a year's time, therefore there should be but one brood per year. No estimate can be given as to the number of eggs produced by a single female, but possibly it is between 100 and 200.

Recently (March, 1930), in Pernambuco, in company with Messrs. Seeley and Kelly, I found old lumber in one of the lumber yards (evidently which had been stored there for a year or more) with numerous holes, very similar in appearance to those made by larvae in wood and lead kept under laboratory conditions.

Time did not permit a more thorough examination of the wood, but it would thus appear that possibly the lumber yards may be suspected as a source of the beetles.

It should be understood, however, that another, but very much smaller species of beetle is to be found in great abundance in lumber yards, and they

too make holes very similar in size and shape to those made by the larva the "*Megaderus stigma*."

This small insect is commonly known as the Powder-Post beetle and its presence may be surmised by the presence of fine flour-like wood dust resulting from their borings.

Mr. Seeley showed me a nearby section of the city, wherein damage to the cables was particularly severe, and suggested that the odor arising from several sugar factories located here, attracted the beetles to this immediate vicinity.

(Signed) RAYMOND C. SHANNON.

From my own personal observations and also from reports received from other States in Brazil—namely Bahia, Alagôas and São Paulo—I can confirm that the areas affected by the depredations of the beetles, generally contain armazens for sugar, wine or spirit, or some odorous food which attract the beetles to those locations.

On March 31st, 1930, with Dr. Shannon and Mr. G. Lopes, the writer visited the lumber yard "Xixi" Rua Pilar in the affected area Bahia. Much of the timber had the small holes but usually they were accompanied by the presence of the wood dust made by the borings of the powder-post beetles. However, below one plank there were found several small cone-shaped piles of sawdust and this was examined. Three large size galleries were found and in each of them was found the larva¹ of a Cerambycid beetle. One of the larvae was well over an inch in length, the other two were little more than half an inch long. It can not here be stated that they are actually the *Megaderus stigma*, but the presence of larvae belonging to this group of beetles in the timber yards is of sufficient importance to place the yards under suspicion.

It appears that the lumber arrives from the interior with the larvae already in the wood, as the plank in question had been in the yard approximately two months and owing to shipping delays it had taken about three months to arrive from Caravellas (south of the State of Bahia) to the Port of Bahia (São Salvador). Similar entrance holes were found in wine casks stored in a wine shop and from the statement of the dealer it appears these borings occur with frequency in this district, his attention being drawn to these holes by the leakage of wine. Again, there is a possibility that these holes are made by the powder-post beetle. No adult beetles of *Megaderus stigma* have been found in Bahia during the course of this investigation.

It may be of interest to state that in one area, outside the sphere of operations of the Empresas Electricas Brasileiras,

¹Subsequent examination of these larvae by Dr. F. C. Craighead proved that they are not even closely related to *Megaderus* and therefore not concerned in the lead cable injury.

it is reported that a cure has been effected by wrapping the plain lead sheath with white cotton tape—the tape being afterwards painted with a red oxide paint. It is probable that a serving of tarred jute over the lead sheath would also afford protection from the larvae and in addition would doubtless make the cable distasteful to the female beetle. On the other hand, if the misguided females could all be tempted to lay their eggs on lead instead of wood, the race would become extinct.

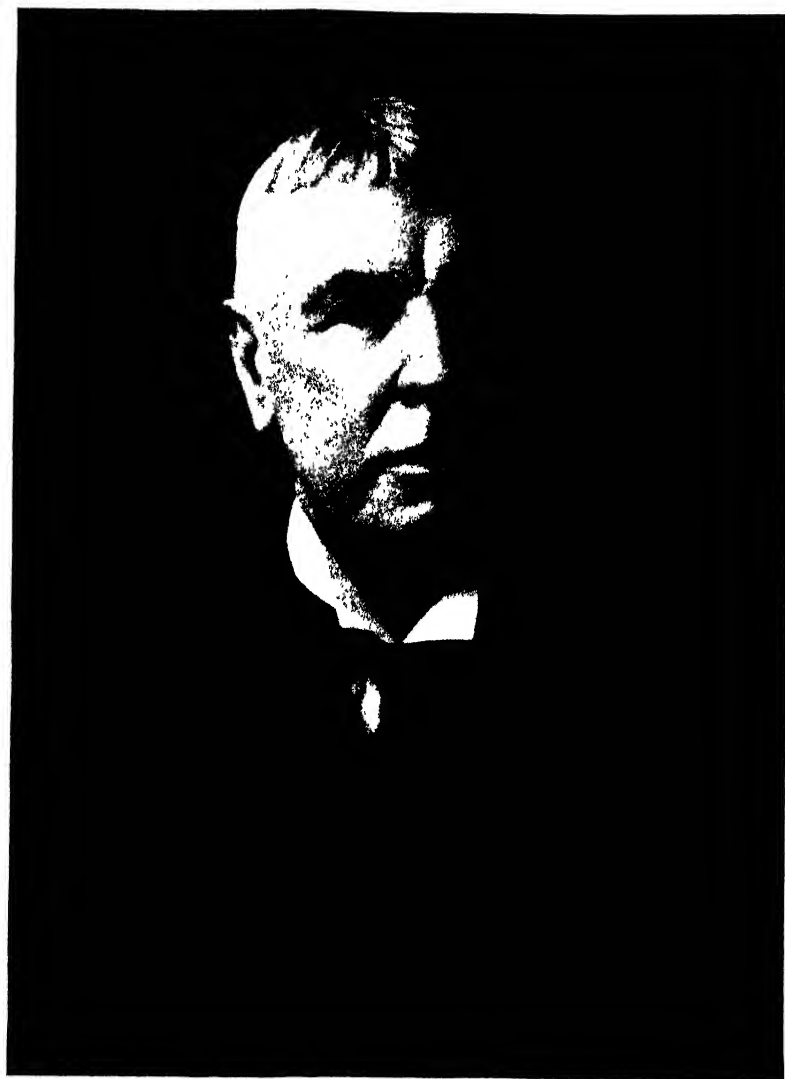
In view of the extended use of aerial lead-covered cable all over the world it is hoped that these notes will stimulate further interest in the problem before us. Much can be done by co-operation and interchange of experiences and by pooling our ideas it may yet be possible to restrict the destructiveness of the *Megaderus stigma* to their natural wood-boring habits.

WILLIAM BARNES.¹

On May first, after a protracted illness, Dr. William Barnes died. His passing closes an important chapter in American Entomology and ends a varied and interesting career. William Barnes was a rare man, distinguished as a surgeon, eminent as a citizen and public benefactor, first among American Lepidopterists and unsurpassed as a host and friend. His entire life—except for the time passed at college and in traveling—was spent in Decatur, Illinois. There he was born on September 3, 1860. There he was graduated in 1877 from the Decatur High School. There, after graduation from Harvard University (1883) and Harvard Medical School (1886) and after a postgraduate medical study in Germany, he returned to begin his career as a surgeon, to carry on his researches in American Lepidoptera and to bring together the great collection that bears his name and that is generally conceded to be the largest, finest, most complete, and most accurately determined collection of American Lepidoptera in the world.² If Dr. Barnes had done nothing but assemble this collection, he would have done a great work, but he did much more. He employed specialists to work on his collection and made it free of access to any responsible worker. During his lifetime Decatur was an Entomological center, a rallying point for Lepidopterists, where hospitality was open and "indoor collecting" of the best. He gave material freely to other Museums and collectors. He published extensively. The copiously illustrated "Contributions to the Natural History of the North American Lepidoptera," embodying the researches of himself and his collaborators and consisting of extensive descriptive and revisionary papers, is an important addition to Entomological literature. He was active in civic affairs and a tireless worker for any project, institution, or cause that would benefit his community. He was one of the founders and supporters of the Decatur and Macon County Hospital at Decatur, and a guiding spirit in that institution until his death. He enjoyed good living, appreciated good books, and despised hypocrites and frauds. Working under him was, as Foster H. Benjamin once remarked, "like taking a postgraduate course. You really began to make fewer mistakes." With his passing, Entomology loses a master worker and a princely patron, our society a valued member, and we, who knew him intimately, a rare and steadfast friend.

¹Prepared at the request of the Society by William Schaus, August Busck, and Carl Heinrich.

²As this goes to press, we learn that this magnificent collection has been secured through act of Congress by the U. S. Bureau of Entomology and will be deposited in the U. S. National Museum.



WILLIAM BARNES

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SIX NEW SPECIES OF MALLOPHAGA.

By H. E. FWING, *United States Bureau of Entomology.*

Here are given the descriptions of six new species of biting lice. Each of these species is somewhat unusual in certain anatomical structures. The descriptions are in a way preliminary ones, as further studies are contemplated.

***Colpocephalum menoponoides*, new species.**

Head of the *Menopon* type; ocular emarginations slight; expansions of head above antennal fossae, each with transverse suture. Eyes double, corneas degenerate, pigment spot pronounced; labrum greatly reduced; ventral clypeal region without sclerite; gular area about two-thirds as broad as long, gular setae very long, six in each row, first somewhat smaller than the rest.

Thorax somewhat longer than head; prothorax with strongly developed lateral lobes, each bearing a small anterior spine and a very long posterior seta; setae in posterior transverse row of prothorax eight, long, equally spaced. Mesothorax scarcely half as big as metathorax but separated from the latter by a somewhat indistinct dorsal suture. Metathorax not as broad as first abdominal segment, with about a dozen long subequal setae in transverse row.

Abdomen broad, broadest near the middle, with all its nine segments un-reduced. Tergites poorly sclerotized, each typically with two transverse rows of dorsal setae. Spiracles minute, subequal and each situated laterally in a tergite. Last segment of abdomen with a marginal fringe of equally spaced, slender setae. Abdomen with only two pairs of ventral combs, which are on the third sternite. On one side of fourth sternite in one specimen there is an incomplete comb.

Legs typical, last pair longest. Third femora each with three complete ventral combs. Claws sharp but curved chiefly near the tip.

Length of female, 1.80 mm.; width, 0.78 mm.

Type host and type locality.—From *Fulica* sp., National Zoological Park, Washington, District of Columbia.

Type slide.—Cat. No. 42852, U. S. N. M.

Described from three females taken from a coot, *Fulica* sp., at the National Zoological Park. This species is so decidedly *Menopon*-like that it would be placed in the genus *Menopon* but for the ventral combs.

***Colpocephalum africana*, new species.**

Head with large, protruding, rounded temporal lobes and well developed temporal bands (occipital bands), the latter being densely pigmented at the ends. Each expansion of head over antennal fossa pigmented, scaled above and with only lateral notch. Eyes wanting. Anterior margin of clypeus with about six setae and a pair of erect peg-like spines; last seta in lateral marginal row of forehead very long, next to last short.

Thorax about as long as head; prothorax angulate laterally and with a spine at lateral apex; prothoracic marginal setae stout, twelve in number; prosternite a small tubercle; mesothorax small, about twice as broad as long, almost completely overlapped dorsally by metathorax, separated from the latter dorsally by a line. Metathorax as large as pro-, and mesothorax taken together, broadest at posterior margin and studded above with setae arranged into irregular transverse and longitudinal rows.

Abdomen long and narrow, none of its nine segments reduced; tergites fused with pleurites and studded with many small, spinelike setae, also each bearing along its posterior margin a row of large, long setae; spiracles minute, subequal, dorso-lateral. Sternite III with three combs on each side.

Rodlike basal plate of male genital armature extending forward to anterior margin of segment III; parameres greatly reduced, almost straight and not reaching the end of endomeral plate; dorsal chitinizations resembling a spearhead with two large, lateral, recurved teeth near the base at each side and two converging rows of short, sharp, recurved teeth on ventral side.

Legs well sclerotized; first coxae platelike, contiguous at their posterior ends and divergent anteriorly; claws rather weak, sharp, slightly curved.

Length of male, 2.20 mm.; width, 0.66 mm.

Type host and type locality.—*Alopothen aegyptiacus*, from Tana River, British East Africa.

Type (holotype).—Cat. No. 42853, U. S. N. M.

A single male specimen from type host, a goose, at type locality, August 24, 1912.

***Colpocephalum echinatum*, new species.**

Head much broader than long; temporal lobes large, subquadrate; labrum small, not extending laterally to bases of mandibles; anteclypeus (ventral clypeal region) almost obliterated; temporal bands (occipital bands) almost interrupted but expanded and heavily pigmented at the ends; anterior margin of clypeus with six short setae, the inner pair being dark and spinelike; last seta on lateral margin of forehead stout, about equal in length to last segment of palpus, next to last seta short, spinelike; eyes wanting.

Thorax slightly longer than head; prothorax fitting into and filling up occipital emargination, strongly lobed laterally; prosternite a flattened, spinelike tubercle; mesothorax subquadrate, broader than long, so completely overlapped dorsally by metathorax as to be seen from above only as a strongly sclerotized neck uniting rest of body to prothorax; metathorax not as broad as segment I of abdomen, above sparsely clothed with setae of varying length.

Abdomen of male broad and stout; segment I longer than II; segment VIII about one and a half times as long as VII; segment IX broadly rounded both in front and behind and with about ten long setae on the posterior margin. Abdomen of female beyond segment II drawn out into a long flat cone. Tergites completely fused with pleurites, provided with but few setae except near their lateral margins; last tergite with straight converging sides and angulate posterior margin. Posterior margin of this tergite with a fringe of setae, some of which are grouped into a tuft at the apex. Each pleurite typically with a very long seta and several short ones. Spiracles minute, subequal, dorso-lateral.

Rodlike basal plate of male genital armature extending to base of abdomen; parameres straight, blunt pointed, as long as endomeral plate; dorsal chitinizations (inner chitinizations) spear-head shape, with two pairs of large, hooklike, lateral teeth, but without smaller ventral teeth.

Legs stout; first coxae platelike, remarkably developed, anterior half of each quadrangular, well sclerotized, posterior half attenuated, semi-hyaline and overlapping the mesothorax for half of the latter's length; femur of each leg of posterior pair with 4-5 ventral combs.

Length of female, 2.15 mm.; width, 0.78 mm.; length of male, 1.35 mm.; width, 0.65 mm.

Type host and type locality.—*Pavo muticus* from Trong, Lower Siam.

Type slide.—Cat. No. 42854, U. S. N. M.

Description based on five females and one male taken from skin of type host, obtained at type locality. Specimens collected and mounted by Dr. E. A. Chapin. Kellogg and Paine have described a *Colpocephalum*, *C. thoracicum* taken from *Pavo muticus* in Burma. Their species is of a type different from *echinatum*. In it the abdomen of the female is not drawn out so as to be cone shaped; also the pterothorax of *thoracicum* is of a shape entirely different from that of *echinatum*.

***Lipeurus volsellus*, new species.**

Head about one and two-thirds times as long as wide; forehead broadest at posterior aspect; trabeculae short, triangular, as broad as long. Labrum much reduced, membranous area in front of labrum very large. Temples very broadly rounded, not protruding, each with a single large seta and several minute ones. Eyes degenerate; corneas not evenly rounded; ocular seta small.

Thorax about as long as head; prothorax twice as broad as long, without any large setae; mesothorax completely fused with metathorax; pterothorax twice as long as prothorax and broader than either head or first abdominal segment, with about eight posterior marginal setae.

First segment of abdomen reduced, quadrangular, not as broad as second; segments VIII and IX fused in female but separated in male; segment VIII of male with a lateral, ventral pair of long, curved, hooklike appendages, equal in length to the segment that bears them; segment IX of male formed into two conspicuous lobes that curve backward, downward and inward; fused segments

VIII and IX of female ending in a stout pair of forceps and bearing a pair of poorly developed gonapods. Each typical pleurite of abdomen articulates with pleurite in front of it by means of an inner, capitate condyle.

Genital armature of male small, degenerate; basal plate extending forward only to about the middle of seventh abdominal segment; parameres minute, immovable, vestigial; endomeral sclerotization diamond-shape.

Legs rather long, last pair much the longest; each tibia of each pair of legs provided with an enlarged distal spine that is used to appose tarsal claws. First coxae contiguous, last coxae broadly separated.

Length of male, 1.90 mm.; width, 0.41 mm.; length of female, 2.25 mm.; width, 0.60 mm.

Type host and type locality.—*Aramides cajaneus* *chiricote* from Gatun, Canal Zone, Panama.

Type (holotype).—Cat. No. 42855, U. S. N. M.

Described from a male and female. Female from type host and type locality, May 4, 1911, by Biological Survey; male (straggler) from a quail, Canal Zone, Panama, by Biological Survey. An unusual species, particularly on account of the reduction in size of the first segment of the abdomen, and in the shape of last abdominal segment.

***Trichodectes brachycephalus*, new species.**

Head much flattened, being almost twice as broad as long. Forehead reduced, triangular, sides about straight; trabeculae fixed, medium, tuberclelike; ventral cephalic groove deep, narrow, flanked by a pair of recurved, hooklike tubercles. Fronto-clypeal apodomes situated about midway between the trabeculae and apex of head, each continued dorsally and posteriorly into a free, projecting spinelike tubercle. True eyes wanting, each eye being represented by a corrugated tubercle; ocular seta wanting. Antennae of male large; first segment much enlarged, about as long as other two taken together; last segment somewhat uncinat and terminating in two short, stout, sharp spines.

Thorax broad and short; prothorax about twice as broad as long but not as broad as head; mesothorax completely fused with metathorax; pterothorax about four times as broad as long, expanded laterally into winglike lobes, and bearing a posterior, submarginal row of about six, subequal, dorsal setae; sternal plates wanting.

Abdomen short and broad, being the broadest part of the body. Pleural plates well developed and all present. Spiracles subequal, very large, situated in pleural plates. Segments VIII and IX fused in male; sternite of VIII forming the large genital plate which is about half as long as abdomen and three-fourths as broad as long.

Genital plate of male genital armature represented by two divergent rods; parameres large, flat, somewhat platelike, slightly curved and each terminating in a small knob; endomeral plate represented by two large semi-circular strips of chitin that unite to produce the pseudopenis; pseudopenis extending almost to tips of parameres and ending in a trefoil.

Legs short; coxae close together, third pair contiguous; trochanters and tarsi very short.

Length of male, 1.15 mm.; width, 0.76 mm.

Type host and type locality.—*Nycticebus coucang*, from Johor Lama, Malay Peninsula.

Type.—Cat. No. 42856, U. S. N. M.

Described from a male specimen taken from a skin (U. S. N. M. 114151) of the type host, a flying lemur. This species is unusual in having such a large genital plate and in the extreme width relative to length of the pterothorax.

***Trichodectes abnormis*, new species.**

Head somewhat asymmetrical, the right lateral margin of forehead being very broadly rounded, almost straight; while the left lateral margin is produced into more or less of an angle at the base of the marginal thickening of ventral cephalic groove. Temporal lobes rounded, not protruding; eyes reduced, without pigment, ocular seta about twice as long as diameter of eye; trabeculae very large, as broad as long, not reaching the end of first antennal segment; fronto-clypeal apodeme at the base of trabeculae, not showing line of closure.

Thorax much shorter than the head but equal in width to the latter; prothorax about three times as broad as long, but not as broad as the pterothorax; prothoracic spiracles very large, in diameter equal to about one-half the length of prothorax, situated ventrally in pleural regions. Pterothorax with very short, strongly divergent sides and broadly rounded, outwardly curved posterior margin.

Abdomen stout, broadest at third segment; pleurites all present but poorly sclerotized; spiracles wanting; eighth abdominal segment almost as broad as long, subcylindrical; ninth segment very small, broader than long, cone-shape.

Basal plate of male genital armature with lateral margins thickened; parameres very unusual, each being a straight rodlike structure arising proximal to endomeral plate and extending along side of its fellow to tip of eighth abdominal segment; endomeral plate represented by a crescent of chitin, hinged at each end to the thickened margin of the basal plate.

Coxae ventral, anterior pair almost contiguous, second pair farthest apart; leg I short, with tibia bearing a stout distal spine functioning as a thumb.

Length of male, 1.10 mm.; width, 0.50 mm.

Type host and type locality.—*Lemur rufus* from east coast of Madagascar.

Type (holotype).—Cat. No. 42879, U. S. N. M.

A single male from skin (U. S. N. M. 63338) of type host, taken at type locality, June 12, 1895. An unusual species in several respects. The asymmetry of the head is not pronounced and possibly may be due to individual variation.

THE DISCOVERY OF WHAT IS POSSIBLY THE LARVA OF AN INTRODUCED TENEBRIONID, *LEICHENUM VARIEGATUM* KÜST.

By R. A. ST. GEORGE,

Bureau of Entomology, United States Department of Agriculture.

In a recent study of the larvae of the Tenebrionid sub-family Opatrinæ, as represented in the U. S. National Museum collection, an undetermined specimen was found which appears to be of considerable taxonomic interest. An examination of the characters of this larva revealed its relationship to the Opatrinae. In the collection only one North American genus, *Ephalus*, and species, *latimanus* Lec., are represented in this subfamily. Two larvae and an adult of this latter species were taken at Wareham, Massachusetts, by S. Henshaw in May, 1895.

The foregoing undetermined specimen differed from the larvae of *Ephalus* sufficiently to indicate that it belonged to another genus. This specimen was collected around the roots of Bermuda grass that was found along the shore of Mobile Bay in Alabama.

An examination of Leng's catalogue to determine the distribution of other forms in this subfamily indicated that none of the genera of the tribe Opatrumi, to which *Ephalus* belongs, were indigenous to the Gulf-Coast region and only one genus in the remaining tribe Leichenini. This genus, *Leichenum*, possesses the single species *L. variegatum* Küst. It is a species introduced from Madagascar and the only locality from which it is known in this country, according to Leng, is Alabama.

In view of this it seemed to the writer that this larva might quite possibly be that of *Leichenum variegatum* and that it could easily have become established either by adults escaping while goods were being unloaded from a ship, or through the dropping or throwing out of infested material which contained nearly mature larvae, the latter completing their development and then becoming associated with the roots of the Bermuda grass. The specimen was collected by Mr. H. P. Loding along the bay shore. The date of collection was not given.

The following characters define the larvae of Opatrinae and are common to the specimen tentatively determined as *Leichenum variegatum* Küst.:

Back of the mandible opposite the cutting edge slightly sharp, and opposite the molar part with a membranous elevation bearing anteriorly one or two setae and posteriorly as many short, thick spines, apex of both mandibles bifid with an additional dorsal tooth between apex and molar part.

Ninth abdominal segment shorter than eighth, usually wider than long, subconically produced, obtusely pointed, apex not mucronate; side margins posteriorly set with from two to eleven spines on each side, tergum otherwise without

spines, paramedianly with one anterior and one posterior pair of setae; sternum with a few setae, often arranged in a transverse row.

Tenth segment with a pair of subconical, setiferous anal pseudopods, which sometimes bear two to three spines.

Clypeus usually armed with two spines and two setae, one of each on each side. In *Opatrum depressum*, a form from Java, there are only the two setae.

Labrum armed, the disc bearing either two spines, one on each side, or six spines, three on each side.

First article of antenna usually slightly shorter than second, except in *Phylax littoralis* Muls. (an European species), which has the first article twice as long as second.

Dorsal half of head capsule not setose but sides and ventral half sometimes slightly setose.

Ocelli arranged in a single transverse group on each side of head.

Epipharynx bearing three spine-like setae along the anterolateral margin, two hooks medianly; usually without two large teeth posteriorly, but sometimes with numerous minute ones.

Hypopharyngeal sclerite tricuspidate, with the median portion slightly produced but not bifid.

Prothoracic legs larger than the two other pairs; claw incurved, slender and tapering.

Abdominal spiracles annular, with circular mouth piece

EXPLANATION OF PLATE.

Leichenium variegatum Küst.? Details of larva.

(Drawings by the author.)

Fig. 1. Dorsal view of head showing the clypeus (*cl*), labrum (*lab*), and articles of antenna (*1*, *2*, *3*).

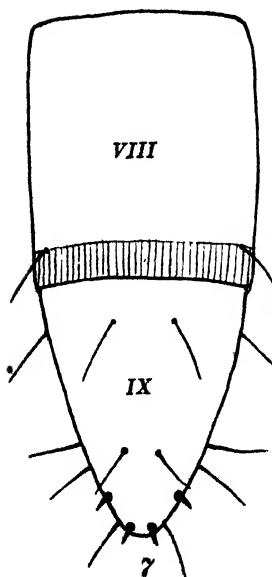
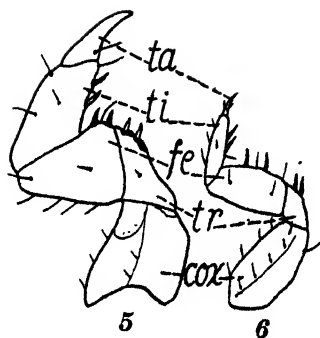
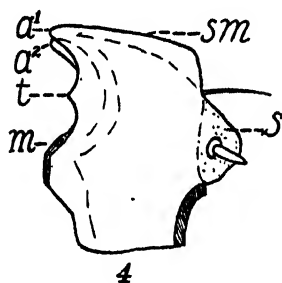
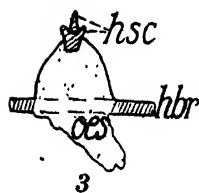
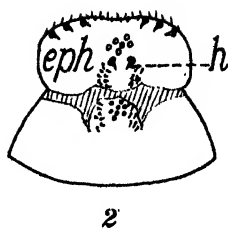
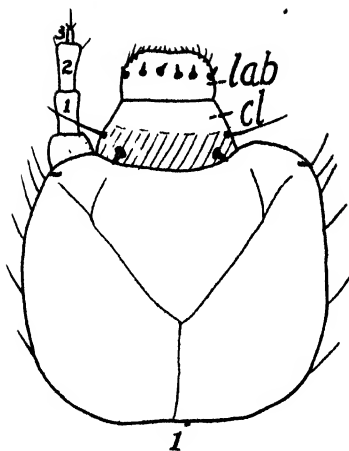
Fig. 2. Epipharynx and anterior margin of labrum; *eph*, epipharynx; *h*, median paired hooks.

Fig. 3. Hypopharyngeal region, portion of oesophagus and hypopharyngeal bracon; *hsc*, hypopharyngeal sclerite; *hbr*, hypopharyngeal bracon; *oes*, oesophagus.

Fig. 4. Dorsal side of right mandible; *a*¹ and *a*², bicuspidate apex; *t*, additional dorsal tooth of cutting edge between apex (*a*¹) and molar part (*m*); *sm*, sharp margin on back opposite the cutting edge; *s*, membranous swelling on back opposite the molar part (*m*), bearing a seta anteriorly and a spine posteriorly.

Figs. 5, 6. Left prothoracic and metathoracic legs, respectively, showing anterior face; *cox*, coxa; *tr*, trochanter; *fe*, femur; *ti*, tibia; *ta*, tarsus.

Fig. 7. Dorsal view of eighth (VIII) and ninth (IX) abdominal ("pygidial") segments.



NEW WEST INDIAN BUPRESTIDAE (COLEOPTERA).

By W. S. FISHER,

Bureau of Entomology, United States Department of Agriculture.

In working over the West Indian material in the family Buprestidae which has accumulated during the past year the writer found the new species herein described.

***Polycesta insulana*, new species.**

Female.—Broadly elongate, two and three-fourths times as long as wide, broadly, equally rounded in front and behind, moderately convex above, and uniformly piceous, with a vague reddish-brown tinge on the dorsal surface.

Head flat, and feebly, transversely depressed between the antennal cavities; occiput without longitudinal carina; surface coarsely, deeply, irregularly punctate, the punctures variable in size and more or less confluent, and sparsely clothed with long, erect, inconspicuous hairs; intervals irregular in shape, convex, smooth, and shining; epistoma broad, and feebly, arcuately emarginate in front.

Pronotum strongly transverse, two times as wide as long, slightly narrower in front than behind, and widest at basal third; sides strongly obliquely expanded from apical angles to basal third, where they are obtusely angulated or rounded, then strongly narrowed to the posterior angles, which are nearly rectangular; anterior margin deeply, arcuately emarginate, with a broadly, vaguely rounded median lobe, and the margin smooth and feebly elevated; base feebly, obliquely arcuate on each side, with the median lobe broad, slightly produced, and narrowly truncate in front of scutellum; disk with a broad, angular, moderately deep median depression; surface coarsely, deeply, irregularly punctate, the punctures well separated on the median part, but becoming more or less confluent toward the sides of the pronotum, and with a few short, inconspicuous hairs arising from the punctures; intervals finely, densely granulose, and subopaque. Scutellum subquadrate, wider behind than in front, and slightly elevated.

Elytra feebly convex, and about as wide as pronotum at base; humeral angles broadly rounded; sides feebly expanded behind the humeral angles, nearly parallel to apical third, where they are slightly wider than at base, then arcuately narrowed to the tips which are conjointly broadly rounded, the lateral margins coarsely, irregularly serrate posteriorly; each elytron with five smooth, longitudinal costae including the scutellar one, which is distinct and extends nearly to middle of elytron, the two discal costae extending from base to apex of elytron, and the third costa interrupted near the humerus; there are also ten rows of deep, round punctures on each elytron, which are arranged in double rows between the costae, and the rows separated from each other by straight, longitudinal intercostae, which are subequal in height to the costae, the punctures rather uniform in size and shape, usually well separated from each other on the disk, but becoming more or less confluent toward the lateral margins; surface of costae, sutural and lateral margins sparsely, vaguely punctate, and clothed with a few very short, inconspicuous hairs.

Abdomen beneath coarsely, densely punctate, and rather densely clothed with

moderately long, semierect, cinereous hairs; intervals smooth and shining; first segment moderately convex, sparsely punctate at middle, and without a densely punctured and pubescent median spot; last segment broadly rounded at apex. Prosternum moderately convex, coarsely, densely punctate, and sparsely clothed with long, erect, inconspicuous hairs; anterior margin feebly elevated, nearly truncate at middle, and with a broad, vaguely indicated lobe on each side; prosternal process short, very broad, nearly flat, and without marginal grooves, the sides obliquely narrowed to middle of anterior coxal cavities, where they are emarginate and abruptly narrowed, then obliquely narrowed to the apex, which is broadly rounded.

Length, 21.5 mm.; width, 8 mm.

Type locality.—Bath, Jamaica.

Type.—Cat. No. 43136, U. S. National Museum.

Described from a unique female collected at the type locality by Wirt Robinson during July, 1902.

In my table of the species of *Polycesta*¹ known from the West Indies, this species runs to No. 7, but it differs from *chevrolati* Thomson in having the punctures on the elytra round and arranged in regular rows, and the pronotum broadly and deeply depressed at the middle. According to the description of *perfecta* Kerremans, *insulana* differs from that species in coloration, and in having small, round punctures on the elytra. This species also resembles *thomae* Chevrolat, but differs from that species in having very distinct scutellar costae, the intercostae on the elytra straight, subequal in height to the costae, and the punctures between the costae are round, nearly equal in size and shape, and arranged in double rows. The writer has not examined specimens of *perfecta* Kerremans or *gossei* Waterhouse, both described from Jamaica, but *insulana* does not agree with the description given for either of these species.

***Psiloptera (Lampetis) aurata* var. *domingoensis*, new variety.**

Similar in shape and structure to *aurata* Saunders, but differs from it in color. Elytra brownish black, with distinct greenish and purplish reflections when viewed in certain lights, and the lateral margins broadly reddish cupreous behind the middle. In the typical *aurata* the elytra are of a uniform aeneo-cupreous or aureo-cupreous color.

Length, 17-23 mm.; width, 6.5-9.5 mm.

Type locality.—Romana, Santo Domingo.

Type and paratype.—Cat. No. 43137, U. S. National Museum.

Described from two specimens collected at the type locality during July, 1925, by H. F. Box.

¹Proc. U. S. Nat. Mus., vol. 65, No. 2522, Art. 9, 1925, p. 8.

Actenodes nobilis (Linnaeus).

Buprestis nobilis Linnaeus, Syst. Nat., 10 ed., 1758, p. 410.

A single example of this species was collected at Port-au-Prince, Haiti, during 1899, by R. J. Crew, and it is identical with specimens of this species from Brazil. This species was originally described by Linnaeus from "Indiis." It has been recorded in the literature from various parts of Mexico, Central America, and South America, but this is the first time it has been recorded from a definite locality in the West Indies.

Peronaemis elegans, new species.

Broadly agriliform, broadly rounded in front, strongly acuminate behind, glabrous, and rather strongly shining; head green, with the entire median part purplish red, margined golden yellow; pronotum purplish red, base and anterior margin narrowly green, with a large bluish green spot becoming golden yellow internally at the posterior angles; scutellum violaceous; elytra purplish or brownish red, the bases and lateral and sutural margins narrowly bluish green or violaceous, more or less margined golden yellow internally, and each elytron with a large inconspicuous purplish spot at middle, behind which is a small inconspicuous golden yellow spot; beneath bluish green, with a distinct cupreous tinge when viewed in certain lights, and the legs violaceous.

Head feebly and evenly convex, nearly flat between the eyes, with a short longitudinal carina on the occiput, and without any distinct depressions; surface coarsely, densely, deeply, regularly punctate; intervals smooth on the front, but becoming finely granulose on the occiput; epistoma wide between the antennal cavities (about four times as wide as the cavities), vaguely, broadly, arcuately emarginate in front, with the sides strongly angulated.

Pronotum strongly convex, one and one-half times as wide as long, slightly wider at base than at apex, and widest along basal half; sides arcuately expanded from apical angles to apical third, then nearly parallel to the posterior angles, which are rectangular; anterior margin with a vague, broadly rounded median lobe; base nearly transversely truncate, with a vaguely rounded median lobe; lateral margins when viewed from the side sharply defined, arcuate, and extending from base to anterior margin; surface with three large basal depressions extending to middle of pronotum, the median one broader than the lateral ones, densely and coarsely punctate, the punctures deep and irregularly distributed; intervals finely granulose toward base, and with a more or less distinct longitudinal smooth space in the median depression. Scutellum nearly twice as wide as long, obliquely narrowed anteriorly, broadly rounded posteriorly and the surface transversely depressed and finely reticulate.

- Elytra slightly wider than pronotum at base; sides nearly parallel to behind the middle, where they are slightly arcuately expanded, then obliquely narrowed to the tips, which are acute, and the lateral margins finely and irregularly serrate; humeral angles rectangular; basal depressions broad, transverse, and shallow; surface more or less irregularly rugose in the basal regions, and punctate-striate, the punctures irregular in the striae, coarse in the basal regions but becoming

finer toward the apices; intervals finely, densely granulose, and sparsely, irregularly punctate.

Abdomen beneath strongly convex, rather densely punctate, the punctures well separated and becoming finer toward the apex of the abdomen, and from each puncture arises a moderately long, semierect, inconspicuous hair; intervals finely, densely granulose; last segment strongly attenuate, and feebly, arcuately emarginate at apex. Prosternum very coarsely punctate, the punctures deep and well separated; anterior margin transversely truncate; prosternal process nearly flat, sides nearly parallel to behind the coxae, then obliquely narrowed to the apex, which is broadly rounded. Posterior coxae strongly concave, and the surface irregularly punctate, the punctures coarse internally but becoming finer externally.

Length, 10 mm.; width, 3.2 mm.

Type locality.—Loma del Gato Mountains, Oriente Province, Cuba.

Type.—Cat. No. 43138, U. S. National Museum.

Described from a single example (sex not determined) received from S. C. Bruner, and collected by Brother Hermano Norberto, of La Salle College, Havana, at the type locality during July, 1925, at an elevation of approximately 900 meters.

This is the second species to be described in the genus *Peronaemis*, and it differs from the genotype, *thoracicus*, described by Waterhouse from Jamaica, in coloration, and in having the sides of the pronotum nearly parallel along the basal two-thirds, the lateral margins of the pronotum when viewed from the side sharply defined for their entire length, and the elytra more rugose and more strongly punctured.

***Neotrachys hoffmani*, new species.**

Rather broadly elongate, moderately convex, broadly rounded in front, more narrowly rounded posteriorly, slightly narrower behind than in front, glabrous, subopaque, and uniformly dark bronzy green above; beneath piceous, with a vague aeneous tinge.

Head broad, nearly flat, feebly, longitudinally depressed on the front, broadly, deeply, transversely depressed behind the epistoma, and with a deep postoral pore on each side situated at the margin of the antennal cavity; surface finely, densely granulose, and coarsely, irregularly punctate, the punctures shallow, well separated, and becoming obsolete toward the epistoma; epistoma wide between the antennal cavities (about three times as wide as the cavities), and the anterior margin broadly, deeply emarginate, and strongly elevated; antennae short and uniformly piceous.

Pronotum feebly convex, nearly two and one-half times as wide as long at middle, distinctly narrower in front than behind, and widest at base; sides arcuately narrowed from base to anterior angles, and narrowly margined; anterior angles obtuse; posterior angles nearly rectangular and feebly projecting; anterior margin broadly, arcuately emarginate, with the median lobe only

vaguely indicated; base transversely truncate to near middle of each elytron where it is arcuately sinuate, then turning obliquely backward to the scutellum, in front of which it is broadly rounded; surface feebly, broadly depressed along the lateral margins, and the base toward posterior angles finely, densely granulose, and coarsely, sparsely, and irregularly punctate. Scutellum very small and triangular.

Elytra moderately convex, and distinctly wider than pronotum at base; humeral angles broadly rounded; sides nearly parallel to behind middle, then arcuately narrowed to the tips, which are conjointly broadly rounded, with the lateral margins entire; each elytron with a broad, shallow depression along lateral margin, the depression interrupted at the middle by a broad elevation, but without a distinct basal depression; surface somewhat uneven, vaguely rugose, without lateral carinae, and rather densely, coarsely, irregularly punctate, the punctures shallow, and becoming more obsolete toward the apices.

Abdomen beneath coarsely, sparsely, ocellate-punctate, and very sparsely clothed with short, inconspicuous hairs; intervals finely, densely granulose; last segment broadly rounded at apex. Prosternum sparsely, coarsely punctate; anterior margin broadly rounded and feebly declivous; prosternal process broad, slightly expanded behind the coxal cavities, and broadly rounded at apex.

Length, 3 mm.; width, 1.5 mm.

Type locality.—Porto Rico.

Type.—Cat. No. 43139, U. S. National Museum.

Described from a unique specimen collected by W. A. Hoffman and labelled "Porto Rico," without any definite locality.

This species is allied to *guadeloupensis* described by Fleutiaux and Sallé, but differs from that species in being subopaque, uniformly dark bronzy green above, broadly elongate, and not so strongly narrowed posteriorly.

EIGHT NEW SPECIES OF SERPHOIDEA (HYMENOPTERA) FROM BRITISH COLUMBIA.

BY OSCAR WHITTAKER.

The following species are all described from specimens taken in western British Columbia by the writer, in whose collection, except where stated otherwise, all type material remains.

CALLICERATIDAE.

CALLICERAS Nees (= *Ceraphron* Jurine).

Calliceras pacifica, new species.

Female.—Head and thorax black; abdomen brown, basally yellow; antennae with the scape basally brownish-yellow, apically dark brown; pedicel dark brown, apically paler; flagellum brown becoming darker towards apex, the apical three joints black; legs yellow, apex of front femora dorsally brown; apical

joints of tarsi sometimes slightly dusky; wings faintly tinged with brown, tegulae and venation brown, the radius paler. Head transverse, as wide as thorax, one and one-half times as wide as long viewed from above; eyes large, hairy, reaching the occiput which is nearly straight; ocelli in an equilateral triangle, lateral ocelli about as far apart as from the eyes and occiput; vertex and frons shagreened, the latter with a deep depression in front of anterior ocellus which extends as a deep groove to the clypeus; vertex with a groove extending from just behind the anterior ocellus to the occiput and a shallow depression external to the lateral ocelli; facial depression large and deep, smoother than vertex, very finely and somewhat transversely rugulose. Antennae with scape one-half as long as flagellum; pedicel about one and one-half times as long as joint 3; joints 4-6 equally long but becoming distinctly thicker, two-thirds as long as joint 3; joint 7 slightly longer than joint 6; joints 7-9 each slightly longer and considerably thicker than the preceding joint; joint 9 slightly thicker than long; apical joint conic-ovate, twice as long as thick and about as long as joints 3-5 combined. Pronotum very short; mesonotum and scutellum shagreened, the former with a distinct median groove; scutellum elongate, frenal grooves punctate, meeting a short distance from the posterior margin of mesonotum. Head and thorax with short, scattered, pale hairs; propodeum with the posterior angles produced; pleurae smooth. Wings with the radius long, curved. Abdomen polished, longer than the thorax, acutely pointed at the apex, the base emarginate and shortly striate; second tergite somewhat more than twice as long as rest of abdomen.

Length, 1.2-1.3 mm. *Expanse*, 2.1-2.3 mm.

Described from ten specimens taken at Chilliwack on various dates from April to October, 1926-7.

Paratypes sent to U. S. N. M. and Mr. Robert M. Fouts.

Variation.—The basal abdominal band varies a little in brightness and extent and in one example is absent.

APHANOGMUS Thomson.

***Aphanogmus subapterus*, new species.**

Female.—Head and thorax black; scape and pedicel dull yellow, flagellar joints becoming darker from the base, distal joints dark brown; legs, except coxae, yellow; apical joint of front tarsi dusky; abdomen brownish-black. Head very nearly twice as wide as long, wider than the thorax, front and hind margins straight; eyes large, nearly reaching the occiput; ocelli conspicuous, in a triangle, the lateral ocelli about as far apart as from the eyes and further than this from occiput. Vertex rugulose, with a depression before front ocellus; facial depression almost smooth. Antennae subclavate, shorter than the body; scape robust, thickest near base, four times as long as pedicel or about as long as pedicel and joints 3-5 combined; joint 3 slightly longer than pedicel; joints 4 and 5 slightly shorter than pedicel; joints 7 and 8 equal in length to pedicel; joint 9 equal to joint 3, as thick as long; apical joint very nearly twice as long as preceding joint, conic-ovate; basal joints of flagellum basally narrowed, subpedunculate, the apical four joints with a short, distinct, sublateral peduncle. Mesonotum

longitudinally rugulose; scutellum rugulose, extending to posterior face of propodeum, frenum distinct, punctate; scutellum with scattered pale hairs along the side margins. Wings much abbreviated, barely reaching the middle of second tergite. Abdomen highly polished, longer than thorax, basally with short, fine striae and a few pale hairs on the sides, apically acute.

Length, 1.15 mm.

Described from a single female taken at Chilliwack, 13 September, 1927.

***Aphanogmus canadensis*, new species.**

Male.—Black, antennae and legs piceous, scape apically paler; hind coxae, except dorsally, base of all tibiae and all metatarsi sordid yellow, rest of tarsi dusky brown. Head about one and three-quarters as wide as long viewed from above, slightly wider than the thorax. Eyes large, nearly reaching the occiput, which is feebly emarginate. Ocelli conspicuous, in a triangle, the lateral ocelli further apart than from front ocellus or eyes, much nearer to the occiput. Vertex finely reticulate, depressed before front ocellus; frons more finely sculptured; facial depression smooth, with a broad raised area above the base of mandibles, extending upwards toward front ocellus, above this a small, slightly raised tubercle. Antennae slightly longer than the entire body; scape obclavate, as long as joints 3 and 4 combined; pedicel subglobose, about one-third as long as joint 3; joints 3–10 elongate, laterally constricted at base, apically obliquely truncate; joints 4–10 subequal, slightly shorter than joint 3 which is about three times as long as thick; apical joint equal to joint 3, cylindrical, conically pointed at tip; all flagellar joints with sparse, long hairs. Pronotum invisible from above. Mesonotum and scutellum with similar, but coarser, sculpture to the vertex; posterior margin of mesonotum slightly emarginate; scutellum longer than mesonotum, reaching posterior face of propodeum; frenal grooves uniting a considerable distance from base of scutellum. Propodeum with the posterior angles shortly, acutely produced. Wings subhyaline, venation brown, radius almost straight, as long as marginal vein. Abdomen highly polished, shorter than thorax.

Length, 0.97 mm. *Expanse*, 1.8 mm.

Described from two specimens taken at Hollyburn, 8 June, 1928, and 3 July, 1929.

Paratype sent to Mr. Robert M. Fouts.

***Aphanogmus obsoletus*, new species.**

Female.—Black; antennae piceous brown, apex of scape paler; legs piceous brown, apex of front femora, front tibiae and extremities of middle and hind tibiae paler; front tarsi pale brown; middle and hind tarsi yellowish-brown, apical joint of all tarsi dusky. Head about one and one-half times as wide as long, slightly wider than the thorax; eyes large, not reaching the occiput, which is almost straight; ocelli conspicuous, in a triangle; lateral ocelli about as far apart as from the occiput and further than this from the eyes. Vertex shagreened; depressed before front ocellus; facial depression almost smooth, with a rounded

ridge extending from the base of the mandibles almost entirely across the depression. Antennae robust; scape thickest near the base, as long as pedicel and joints 3-5 combined, one-third as long as entire flagellum; pedicel as long as joint 3; joint 3 two and one-half times as long as thick; joints 3-9 subequal in length, gradually becoming thicker, joint 9 only slightly shorter than joint 3, one and one-half times as long as thick; apical joint two and one half times as long as thick, twice as long as the preceding joint. Thorax one and one-half times as long as wide; pronotum invisible from above, mesonotum and scutellum with the sculpture slightly finer than that of the vertex; frenum distinct, anterior margin of basal lobes of scutellum concave; pleurae smooth; posterior angles of propodeum not produced. Wings subhyaline, with a very faint brownish band across the disc, venation brown, radius wanting. Abdomen highly polished, somewhat shorter than the thorax.

Length, 0.97 mm. *Expanse*, 1.95 mm.

Described from a single specimen taken at Hollyburn, 12 May, 1928.

***Aphanogmus dorsalis*, new species.**

Female.—Head and thorax black; scape and pedicel pale yellow, flagellum grading from pale yellow to light brown in the last four joints; front coxae black, trochanters yellowish-brown; femora, except apically, brown; tibiae and tarsi pale yellow; middle coxae basally black, trochanters and coxae apically yellow; middle femora brown, the extremities paler; middle tibiae and tarsi pale yellow, the tibiae brownish in the middle; hind coxae, except the extreme base which is black, trochanters and femora pale yellow; hind tibiae brown, the extremities paler; hind tarsi pale yellow, the metatarsi pale brown; abdomen ventrally yellow, anterior face of second tergite and a large dorsal area, which reaches a little beyond the middle, also yellow, the rest black. Head and thorax smooth; head one and one-half times as wide as long, wider than thorax; eyes large, almost reaching the occiput, which is nearly straight; ocelli conspicuous, in a triangle, the lateral ocelli about as far apart as from the occiput and further than this from the eyes; facial depression smooth and polished. Antennae slender, subclavate; scape obclavate, as long as pedicel and joints 3 and 4 combined; pedicel and joints 3-9 equal in length but becoming gradually thicker; joint 9 twice as long as thick; apical joint one and one-half times as long as preceding joint. Thorax about one and two-thirds as long as wide; vertex, mesonotum and scutellum with microscopic, reticulate, incised sculpture and scattered pale hairs; scutellum very convex, longer than mesonotum, reaching posterior face of propodeum, with a distinct, punctate frenum and with a long, narrow, smooth field, almost reaching the apex, enclosed by two longitudinal, posteriorly convergent carinae; hind angles of propodeum subacute. Wings subhyaline, with a broad, faint, fumose band across the disc, the apex beyond the radius also faintly fumose; costal and marginal nervures brown; radius pale, straight, longer than marginal nervure. Abdomen highly polished, shorter than thorax, base of second tergite without distinct striae.

Length, 0.9 mm. *Expanse*, 1.8 mm.

Described from three specimens from Hollyburn, 18 June and 3 July, 1928.

Paratype sent to Mr. Robert M. Fouts.

CONOSTIGMUS Dahlbom.

Conostigmus pulchellus, new species.

Male.—Black; scape basally brownish yellow, becoming darker on the apical half; pedicel and flagellum black; legs yellowish brown; front tarsi and apical joints of middle and hind tarsi dusky brown; wings fumose, with a darker cloud on disc below radius; venation and stigma dark brown. Head, viewed from above, twice as wide as long, very slightly wider than thorax, obliquely narrowed behind the eyes, which are remote from the occiput; occiput separated from vertex by a carina which is adjoined by a row of punctures; ocelli in a triangle, the lateral ocelli about as far apart as from the eyes and more than this distance from the occiput, considerably in front of hind margin of eyes; vertex and frons coarsely rugose; frons with a depression before front ocellus and with a median, vertical groove extending from this depression towards the clypeus; facial depression smooth, with a deep central pit. Antennae pubescent, slender, filiform, a little longer than the entire body; scape thicker than flagellum; pedicel short, subglobular; joint 3 the longest, longer than scape, six times as long as thick; joints 4–10 becoming shorter and slightly thinner; joint 10 slightly less than one-half as long as joint 3; apical joint slightly longer than preceding joint. Mesonotum and scutellum alutaceous, the lateral lobes of the former and scutellum less conspicuously so; scutellum as long as mesonotum, frenal lines punctate, meeting at anterior margin of scutellum. Propodeum rugose; pleurae smooth, each with a row of conspicuous punctures. Head and thorax with fairly dense, scattered pale hairs. Wings with the subcostal nervure somewhat swollen before reaching the stigma; stigma twice as long as wide; radius gently curved, one and one-half times as long as stigma. Abdomen elongate-oval, considerably longer than thorax, highly polished, constricted and with a few, longitudinal striae at base; second tergite nearly twice as long as rest of abdomen.

Length, 2.9–3.3 mm. *Expanse*, 4.7–5.6 mm.

Described from four specimens taken at Hollyburn, 18 June, 11 July, 1928; 3 and 30 September, 1929.

DIAPRIIDÆ.

MONELATA Foerster.

Monelata nigra, new species.

Female.—Black, polished; antennae with scape, pedicel and proximal flagellar joints reddish brown; flagellar joints becoming darker distally, the apical three or four joints black; legs pale brown, the swollen parts of femora and tibiae dark brown; coxae black; last joint of all tarsi dusky; wings very faintly fumose, venation brown. Head subglobular, viewed from above a little longer than wide; ocelli in an equilateral triangle, much nearer together than to the eyes

and occiput; sides of occiput with brownish, woolly pubescence. Antennae slightly longer than head and thorax combined, two-thirds as long as entire body; scape as long as pedicel and five following joints combined; flagellum two and one-quarter times as long as scape; pedicel as long as joints 3 and 4 combined; joint 3 about as long as two following joints combined; joints 4-9 about as long as thick; joints 10-12 becoming thicker, joint 12 distinctly transverse; apical joint (club) very large, oval, a little more than twice as long as thick, as long as four preceding joints combined. Pronotum short, sides and dorsum, except in the middle, clothed with woolly pubescence; mesonotum with the hind margin feebly convex; scutellum basally broad, narrowed about one-third from base, beyond this with the sides straight and parallel; hind margin straight, posterior angles rounded; propodeum with a distinct, much raised, median carina, the sides clothed with dense woolly pubescence; propleurae and mesopleurae smooth; metapleurae hairy; petiole surrounded with dense woolly hairs. Abdomen as long as head and thorax combined; second tergite widest near the hind margin, about one and one-half times as long as wide, the base ventrally hairy; remaining abdominal segments very short.

Length, 1.5-1.65 mm. *Expanse*, 2.8-3.0 mm.

Described from twelve specimens taken at Hollyburn on various dates from 9 May to 18 September, 1928-30.

Paratypes sent to U. S. N. M., Dr. A. A. Ogloblin and Mr. Robert M. Fouts.

ACANOSEMA Kieffer.

Acanosema sylvana, new species.

Female (Type).—Head, thorax and petiole black; antennae brown, the three or four distal joints blackish; legs brown, base of hind coxae black; abdomen dark brown, wings strongly tinged with brown, venation and tegulae brown. Head smooth and polished; viewed from above about one and one-half times as wide as long, about as wide as thorax; ocelli in a triangle, lateral ocelli separated by slightly less than their distance from the eyes, much further than this from the occiput; occiput, except in the centre, with a ring of pale, tomentose pubescence. Antennae as long as head, thorax and petiole combined, scape terminating in two short, dentate processes, as long as following five joints combined, a little more than four times as long as pedicel; joint 3 one and one-quarter times as long as pedicel, two and one-half times as long as thick; joints 4-14 about equal to pedicel, gradually increasing in thickness; joint 14 as thick as long; apical joint twice as long as preceding joint, nearly twice as long as thick. Thorax smooth and shining; pronotum clothed with dense, pale, tomentose pubescence; mesonotum with deep, percurrent, posteriorly convergent notauli; scutellum with a very deep basal fovea, the sides and apex with long, pale hairs; propodeum with a broad, much raised median carina, having a fine groove down the centre; propleurae and mesopleurae smooth; metapleurae and base of hind coxae hairy. Petiole wider than long, widest in the middle, without striae, anterior margin straight, much narrowed posteriorly. Wings with first abscissa of radius very short, perpendicular to the marginal nervure which is three and one-half times

as long as first abscissa of radius; second abscissa of radius, cubitus, discoidal, median and brachial nervures present as fuscous streaks; second abscissa of radius very long, enclosing an elongate area more than twice as long as marginal nervure; cubitus straight, directed towards the basal nervure, the extreme apex deflected towards the discoidal nervure. Abdomen highly polished, elongate-oval, apically acute, including petiole one and one-third times as long as head and thorax combined; second tergite one and one-half times as long as wide, about one and three-quarters times as long as remaining segments combined; sides and ventral surface of propodeum, petiole and base of second tergite, except narrowly in the centre of dorsum, with long, pale, woolly hairs.

Length, 4.5 mm. (including ovipositor 5.6 mm.). *Expanse*, 7.0 mm.

Male (Allotype).—Antennae with the scape and pedicel light brown, the flagellum very dark brown, slender, longer than head, thorax and petiole combined; scape twice as long as joint 3; pedicel subglobular; joint 3 excised on basal half, two and one-half times as long as pedicel and slightly longer than joint 4; joints 4–13 gradually shorter; joint 13 about half as long as joint 3 and about one and one-half times as long as thick; apical joint about as long as joint 3. Petiole nearly one and one-half times as long as wide, smooth, the sides convex, constricted at base, without distinct striations. Abdomen elongate-oval, including petiole as long as head and thorax combined; second tergite about one and one-half times as long as wide; following segments to the sixth successively shorter. In other characters agrees with the female. The proportions of the petiole vary to some extent, some examples having it nearly as wide as long. The color varies slightly in depth and one specimen has the petiole dark brown like the abdomen. The second abscissa of the radius sometimes fails to quite reach the costal margin of the forewing.

Length, 3.0–4.2 mm. *Expanse*, 6.0–8.0 mm.

Described from a single female taken on 27 August, 1930, and twelve males on various dates from 5 July to 2 October, 1928–9; all from Hollyburn.

Paratypes sent to U. S. N. M., Dr. A. A. Ogloblin and Mr. Robert M. Fouts.

EPIBLEMA STRENUANA WALK., THE HOST OF CERTAIN PARASITES OF THE ORIENTAL FRUIT MOTH, LASPEYRESIA MOLESTA BUSCK (LEPIDOPTERA).

BY H. W. ALLEN AND EARL LOTT,
U. S. Bureau of Entomology, Moorestown, N. J.

One of the interesting new developments in the study of the parasites of the oriental fruit moth is the discovery that a common and widely distributed borer (*Epiblema strenuana* Walk.), the larvae of which occur in the stems of ragweed (*Ambrosia artemisiæfolia*), serves as an alternate host for several of the more important parasites of the oriental fruit moth.

The parasites of the oriental fruit moth which have been reared from *Epiblema strenuana* are *Macrocentrus ancyliivora* Roh., *M. delicatus* Cress., *Glypta rufiscutellaris* Cress., *Pristomerus ocellatus* Cush., and *Cremastus minor* Cush. In New Jersey, the first three mentioned are the most important parasites of the larvae of the oriental fruit moth, and are also among the more abundant parasites of *E. strenuana*. The identity of the parasites reared from *E. strenuana* was established by Mr. R. A. Cushman from adults reared from field-collected larvae, and was corroborated in the case of two of the species, namely, *M. ancyliivora* and *G. rufiscutellaris*, by the observation of mating of individuals of one sex reared from the oriental fruit moth with individuals of the opposite sex reared from *E. strenuana*. The host was determined by Mr. Carl Heinrich. In a total of 284 borers reared from the stems of *Ambrosia* collected near Moorestown, N. J., between August 13 and September 3, last, 10 per cent were parasitized by *M. ancyliivora*, 23 per cent by *M. delicatus*, 18 per cent by *G. rufiscutellaris*, and 5 per cent by *P. ocellatus*. Only 17 per cent of the host adults emerged, the combined parasitism being 83 per cent. From several collections of the same brood of *E. strenuana* obtained from points in Pennsylvania, Ohio, and Indiana, no *M. ancyliivora* was reared. However, numerous *G. rufiscutellaris* and *M. delicatus* were reared from the three States mentioned, and *P. ocellatus* from Pennsylvania and Ohio.

The host, *E. strenuana*, is very widely distributed in the United States westward to the Rocky Mountains. Like the oriental fruit moth, it belongs to the Eucosminae, and its larvae bore in the stems of the host plant as do the larvae of the earlier generations of the oriental fruit moth. It occurs in great abundance over thousands of acres of grain stubble, weedy crops, and field and roadside borders which are overgrown with ragweed in middle to late summer. *E. strenuana* apparently serves as a very important reservoir for parasites of the oriental fruit moth at certain periods of the year when the larger proportion of the larvae of this host are embedded in fruit and hence not accessible to attack by its larval parasites.

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NOTES ON TYPES (HYMENOPTERA : CYNIPIDAE).

BY LEWIS H. WELD, *East Falls Church, Virginia.*

During the two decades or more that Professor J. J. Kieffer worked on the Cynipidae it appears that he never visited the leading entomological museums of Europe to study types but depended mainly on the literature for his understanding of the existing genera. This dependence on the literature alone led to a misunderstanding of some of the Ashmead genera. It led him into error also in the case of some of the genera established by Europeans so that in creating some 55 new genera himself he has made some synonyms especially in cases where the older authors had placed their genera in the wrong subfamilies. No student of the Cynipidae hitherto has attempted to locate and study the types of the genotype species. Recently the writer visited three of the European museums with this as a definite object and it seems desirable to place on record some of the information and conclusions which resulted from this incomplete preliminary study.

PARAMBLYNOTUS Cameron.

Allocynips Kieffer, 1914 Phil. Jour. Sci. D 9 : 185. Synonymy new.

Cameron placed his genus *Paramblynotus* in the Figitinae but the holotype female of the genotype species, *punctulatus*, in the British Museum has not the characteristic segmentation of the abdomen of a Figitid, tergite five and not tergite three being the largest and it is preceded by three (instead of one) shorter, non-liguliform tergites. The genus should be transferred to the Liopterinae. *Allocynips borneensis* Weld is a synonym of it and should be known as *Paramblynotus punctulatus* Cameron. (Synonymy new.) *Allocynips ruficeps* Kieffer, the genotype of *Allocynips*, is a synonym of *Paramblynotus ruficollis* Cameron. (Synonymy new.) All the other described species of *Allocynips* should be transferred to Cameron's genus and known as: *Paramblynotus clarus* (Weld); *P. dyak* (Weld); *P. malayensis* (Weld); *P. isosceles* (Weld); and *P. flaviceps* (Kieffer). (Combinations new.) The male which Cameron received later and subsequently described as the male of his *punctulatus* seems to me to be erroneously associated and to be an undescribed species.

PSEUDIBALIA Kieffer.

One of the characters given for this genus is that the metatarsus of the hind leg is prolonged "au côté interne" into a blunt spur reaching the end of the second segment. The holotype female of the genotype species, *fasciatipennis*, in the British Museum has this spur on the *outer* side as it is in *Ibalia* and not on the inner as described by Kieffer. The petiole is described as 3-4 times as long as broad but measured by a micrometer it is barely three times as long as broad when viewed from above. The relative lengths of the tergites along the dorsal curvature are as (petiole) 17 (width $5\frac{3}{4}$) : 6 : 9 : 23 : 9 : 7 : 9. Height of abdomen 33 and width 23. As both *Pseudibalia* Kieffer and *Paribalia* Weld have the tarsal spur on the outer side the latter genus may be distinguished by having a short petiole (not longer than broad) and having the fifth tergite (instead of the fourth) largest.

NERALSIA Cameron.

Xyalosema D T & K. 1910 Das Tierreich Lief. 24 : 94. Synonymy new.

Neralsia was based on *N. rufipes* from Guatemala and was described (1883, Biol. Cent.-Amer. Hym. 1:74, Pl. 4, fig. 9) as having a closed radial cell (although Cameron's figure shows it open) and thought to be intermediate between the Anacharitinæ and Figitinæ. Das Tierreich put it in the Aspicerinæ. The type in the British Museum is one of the Figitinæ. The abdomen is longer than head plus thorax, the second tergite striate at the base, not liguliform, shorter than the third. The wing is normally pubescent and ciliate and the radial cell is open on the margin. The eyes are sparsely hairy and not bare as stated. *Solenaspis* Ashmead 1887, preoccupied by Osten Sacken in Diptera in 1881 and renamed by Dalla Torre and Kieffer in 1910, is congeneric with this and the name *Xyalosema* should become a synonym of *Neralsia* in the Figitinæ. *Solenaspis singularis* Ashmead is a *Xyalophora* (Comb. new). To the genus *Neralsia* should be transferred the following species:

Neralsia armata (Say) (Diplolepis) 1836 Boston Jour. Nat. Hist. 1 : 266. Comb. n. *

Neralsia hyalinipennis (Ashmead) (*Solenaspis*) Genotype. 1887 Trans. Amer. Ent. Soc. 14: 155. Comb. n. = *dubiosa* Kieffer (*Xyalosema*) 1910 Boll. Laboro. Zool. Portici 4 : 338. Syn. n.

Neralsia ciliatineris Kieffer (*Xyalosema*) 1910 Boll. Laboro. Zool. Portici 4 : 339. Comb. n.

Neralsia evanescens Kieffer (*Xyalosema*) 1907 Ent. Ztschr. Stuttgart 21 : 157. Comb. n.

ANACHAROIDES Cameron.

Coelonychia Kieffer, 1910 Wiss. Erg. Deutch. Zent.-Afr. Exp. 1907-8, 3 (2) : 19.
Synonymy new.

Cameron's genus was based on *Anacharoides striaticeps* (Rec. Albany Mus. 1: 160, 1904) from Cape Colony and placed in the Anacharitinae. The type is in the British Museum and it belongs in the Aspicerinae for the second tergite is liguliform, the wings bare and the veins very pale. The type of *Coelonychia spinosipes* in the Berlin museum is congeneric with this. Therefore Kieffer's *Coelonychia*, correctly placed in the Aspicerinae, becomes a synonym of *Anacharoides* Cameron.

BOTHROCHACIS Cameron.

Stirengoela Cameron, 1910 Entomologist 43 : 180. Synonymy new.
Ditrupaspis Kieffer, 1910 Wiss. Erg. Deutch. Zent.-Afr. Exp. 1907-8, 3 (2) : 18,
Synonymy new.

Cameron's *Bothrochacis* was founded on two males of *Bothrochacis erythropoda* from Cape Colony. Six years later he founded the genus *Stirengoela* on a male of *Stirengoela striaticollis*, also from Cape Colony. The types of both are in the British Museum and they seem to me to be not only congeneric but the same species (Synonymy new.) The type of *Ditrupaspis semirufa* Kieffer from N. Nyassa preserved in the Berlin museum is congeneric with the above. Hence I conclude that both *Stirengoela* and *Ditrupaspis* should become synonyms of *Bothrochacis* Cameron.

ANDRICUS Hartig.

Oncaspis Dettmer, 1925 Natuurhist. Maandb. Maastricht 14 : 123.
Euschmitzia Dettmer, 1925 Natuurhist. Maandb. Maastricht 14 : 122. Synonymy new.

Type material of *Oncaspis filigranata*, the genotype species, seen in Berlin in 1929, runs to *Andricus* and Professor Dettmer wrote me in April, 1927, that he had discovered that it is "almost certainly the long sought for sexual generation of *Andricus solitarius* (Fonsc.) and not a new genus." In 1928, he published a description of the gall and his evidence that it is the sexual generation of *Andricus solitarius* (Fonsc.) in Marcellia 24 : 142. His *Euschmitzia rara*, the genotype, was thought to be a guest-fly in a *Rhodites* gall but as his description was not that of an inquiline his attention was called to the possibility of error and under date of May 1, 1929, he writes me that this species is the sexual generation of *Andricus nudus* Adl. and requests that I

publish it. Thus both of his new genera become synonyms of *Andricus*.

CALLIRHYTIS Förster.

In the original description of the genotype, *Callirhytis hartigi* Förster, it is not stated whether or not the tarsal claws are toothed. Mayr in 1902 considered them as simple and Ashmead in his key to genera in 1903 reversed Mayr's interpretation by putting species with simple claws in *Andricus* (whose genotype has toothed claws) and those with the claws toothed in *Callirhytis*, thus causing a confusion which has persisted to the present day. Das Tierreich has followed Mayr's interpretation but its authors seem to be unacquainted with the genotype species. The museum in Vienna has two specimens labelled "Aachen, *Call. Hartigi*, Förster's type. Collect. G. Mayr." They are males. Without having seen females I venture the guess that this is the sexual generation of a species whose agamic generation will be found to be in "stone galls" inside of acorns. From the above specimens the following notes are made to supplement Förster's original description:

Callirhytis hartigi Förster.

Male.—Amber-colored. Head coriaceous, from above transverse, occiput concave, wider than thorax, cheeks not broadened behind eyes. Malar space .17 eye without groove. Flagellum filiform with cylindrical segments, the first curved and enlarged distally and not quite as long as the second, the last only slightly longer than the penultimate. Mesoscutum with low sharp transverse ridges well separated from each other on a uniformly smooth surface. The parapsidal grooves not very distinct even posteriorly and obsolete in front. Scutellum with transverse groove at base and a suggestion of small narrow pits which open out behind on to disk which is transversely rugose. Mesopleura smooth below, coriaceous across middle, the first and second coxae far separated. Carinae on propodeum straight and parallel. Claws are simple. Wing seems to be normally pubescent and ciliate. First abscissa of radius arcuate, second straight. Abdomen shorter than thorax, longer than high, tergites along dorsal curvature as 30 : 9 : 1 : 0 : 6.

Callirhytis azteca (Cameron). * Comb. new.

Andricus (Aphilothrix) aztecus Cameron, 1897 Ann. & Mag. Nat. Hist. (6) 19 : 261.

The holotype female in the British Museum from Sonora, Mexico, proves to be a *Callirhytis* with hyaline, non-ciliate wings and running to couplet 23 in Section B of my key in Proc. U. S. N. M. 61, Art. 19 : 11. It is evidently from a "stone gall" in an acorn.

***Callirhytis defecta* Kieffer.**

This American species whose types are in Berlin is also one of the "stone gall" in acorn group and runs to couplet 21 on p. 11 in the above mentioned key.

***Amphibolips arcuata* (Kieffer). Comb. new.**

Callirhytis arcuata Kieffer 1910 Boll. Laboro. Zool. Portici. 4: 341.

Of the three specimens in the Berlin Museum all collected by Klug in Georgia and all labelled as types, and supposedly of Kieffer's species above, only one agrees with the description. It is the one numbered "8070" and is here transferred to the genus *Amphibolips*. The number 8037 is a *Callirhytis* and 8022 is a *Disholcaspis*.

HOLOCYNIPS Kieffer.

This genus was founded by Kieffer on a single captured specimen from Georgia described as *Holocynips emarginata* and the genus has hitherto remained unrecognized in our fauna by American students. A study of the holotype in the Berlin Museum shows that the first three species in the writer's key to the root gall forming species of *Callirhytis* in Proc. U. S. N. M. 59: 213 (1921) are congeneric and should be transferred to this genus. Moreover, *corallosa* Weld (1921) proves to be the same species as *emarginata* Kieffer (1910). As this had been suspected, a paratype of *corallosa* had been taken along to Berlin and the above conclusion is the result of a direct comparison. But *corallosa* had previously been shown to be a synonym of *Amphibolips badius* Bassett (1922, Proc. U. S. N. M. 61, Art. 18: 17). Thus recognizing the validity of Kieffer's genus the names of its three species are:

***Holocynips badia* (Bassett). Comb. new.**

Amphibolips badius Bassett (= *Callirhytis corallosa* Weld). Synonymy published.
Holocynips emarginata Kieffer, 1910 Boll. Laboro. Zool. Portici 4: 114. Synonymy new.

A further note on the biology of the species is here added. An adult was taken ovipositing in the buds at the summit of a thrifty shoot of *Quercus alba* L. at East Falls Church, Va., on April 13, 1924. The alternating generation is unknown. One was captured on the roof of the Education Building 125 feet above the sidewalk and a mile from any oak trees in Albany, N. Y., on April 15, 1927.

Holocynips hartmani (Weld). Comb. new

Holocynips maxima (Weld). Comb. new.

A fly of this species was taken ovipositing in the buds of *Quercus alba* L. at Washington, D. C., on March 27, 1921; another was taken April 15, 1924, and two more on April 20. At East Falls Church, Va., one was taken ovipositing in buds of white oak on April 18, 1927, and others on April 6, 13, 19, 20, 1928. The alternating generation is unknown. One was captured on the roof of the Education Building in Albany, N. Y., on April 20, 1927.

LIODORA Förster.

Förster's types of *Liodora sulcata*, the genotype species, were studied, two specimens in Berlin and four in Vienna. They do not seem to me to be congeneric with the sexual generation of *Diplolepis folii* (L.) and it is my present opinion that Das Tierreich has been in error in including *Liodora* in *Diplolepis* and that it would be better to maintain it as separate genus. Through the kindness of Dr. F. Maidl the U. S. National Museum has been able to acquire one of the Vienna specimens in exchange and from this the following notes have been made to supplement Förster's original description.

Liodora sulcata Förster.

Female.—Head from above transverse, as broad as thorax, not broadened behind eyes, occiput slightly concave. Malar space .4 eye without groove. Antennae 14-segmented, relative lengths as (scape) 15 (6) : 8 (6) : 15 (5) : 13 : 11 : 10 : 9 : 9 : 8 : 8 : 8 : 8 (6) : 11. Pronotum "narrow," pubescent on sides. Mesoscutum as broad as long, smooth and shining with a few scattered hairs anteriorly, parapsidal grooves deep, smooth, percurrent, separation at hind margin about three times the width of a groove. No median. Anterior and lateral lines scarcely visible. Scutellum rugose, pubescent, distinctly overhanging metanotum behind, with two deep, smooth, elliptical pits at base separated by a distinct septum. Mesopleura smooth and shining with a few scattered hairs below. Propodeum with two almost straight and parallel carinae enclosing a transverse smooth bare area with no median. Tarsal claws with a distinct tooth. Wing normally pubescent and ciliate, radial cell about four times as long as broad, first abscissa of radius arcuate and one-fifth as long as the second which is straight. Areolet small, reaching one-ninth and the cubitus about three-fourths way to basal. Abdomen sessile, the short rugose neck of propodeum not reaching as far back as the tip of the scutellum; length to height to width as 65 : 55 : 44. Lengths of tergites along dorsal curvature as 50 : 12 (rest hidden), the second with usual pubescent patches at base and hind margin in side view a straight line at angle of 45 degrees to longitudinal axis. Sheaths at same angle, the tips projecting slightly dorsally behind second tergite. Ven-

tral spine in side view directed almost horizontally backward, slender, four times as long as broad at base, a few hairs on ventral surface of hypopygium but scarcely any on spine. Using the width of the head as a base the length of mesonotum ratio is 1.3, length of antenna 2.27, length of wing 4.0. Length of body 2.1 mm.

PANTELIELLA Kieffer.

Through the courtesy of Dr. F. Maidl of the Vienna Museum the U. S. National Museum was given a portion of the type gall cluster of *Panteliella fedtschenkoi* (Rübsaamen), genotype species, on leaf of *Phlomis tuberosa* L. from "Bijou-Onlar, Krim." After relaxing the galls I was able to cut out two adults from which the following notes are made to supplement the original description.

Panteliella fedtschenkoi (Rübsaamen)

Female.—Brown, the head and abdomen lighter, legs yellowish. Head from above transverse, wider than thorax, occiput slightly concave; from in front broader than high, interocular area 1.5 times as broad as high, malar space .6 eye without groove. Antennae 14-segmented, relative lengths of segments (in balsam mount) as (scape) 21 (14) : 24 (14) : 24 (11) : 24 : 24 : 23 (15) : 21 : 21 : 20 : 20 (15) : 20 : 20 : 20 : 30 (13). Pronotum "broad" in the median line as in the *Aylax* group. Mesoscutum under magnification of 75 coriaceous, aciculate behind, without distinct parapsidal grooves (their position however and that of a median is faintly indicated in the sculpture). Scutellum finely rugose with two distinct smooth pits at base separated by a septum from which fine ridges spread out fanwise on to disk. Mesopleura aciculate. Tarsal claws in balsam mount simple (not "weakly toothed"). Wing normally pubescent, first abscissa of radius heavy, straight, about one-sixth length of second which is straight also. Abdomen higher than long, relative lengths of tergites along dorsal curvature as 30 : 8 : 4 : 3 : 2 : 6, second occupying .68 length of abdomen. Ventral spine in side view about twice as long as broad. Using the width of the head as a base the length of mesonotum ratio is 1.0, length of antenna 2.0, length of wing 3.1. Length of body 1.15 mm.

Synergus filicornis Cameron.

Synergus furnessana Weld, 1913, Insecul. Insc. Menst. 1: 134, Pl. 4, figs. 8-13.

Synonymy new.

The Cameron holotype female from Guatemala in the British Museum has the mesopleura all black. Except on this one point the description of my *furnessana* from Mexico agreed with it. I recalled however that there was some variation in color in the type material of *furnessana* and on my return I found among the paratypes a female with black mesopleura. This was sent to London where through the kindness of Dr. James Waterston and Mr. R. B. Benson a direct comparison

was made with the Cameron type. "*Furnessana* is apparently the same as *flicornis*. Neither of us can see anything to distinguish them. The color is exactly similar." Hence I conclude that I have redescribed Cameron's species under the name of *furnessana* which should now go into synonymy.

Information is desired as to the location of the types of any of the following Kieffer species of Cynipidae: *Callirhytis marianii* (*meunieri*); *Holocynips nigra* (1916 from Philippines, not 1910); *Lambertonia abnormis*; *Liebelia cavararæ*; *Lytoxysta brevipalpis*; *Parandricus mairæ*; *Poncyia ferruginea*; *Salpictes rufiventris*, *Tavaresia carinatus*; and *Tylosema nigerrimus*.

THE OCCURRENCE OF THE CRICKETS ANAXIPHA PULICARIA BURM. AND CYCLOPTILUM TRIGONIPALPUM (RHEN AND HEBARD) IN THE VICINITY OF THE DISTRICT OF COLUMBIA, HITHERTO UNREPORTED HERE.

By H. A. ALLARD, U. S. Department of Agriculture, Washington, D. C.

Anaxipha pulicaria Burm.

For a number of years I have made field observations on a tiny cricket occurring in the deep ground debris of cold, wet swampy bogs around Clarendon and Barcroft, Virginia. This tiny cricket appears very early in May and usually becomes silent before July 1. Its stridulation is a continuous weak nemobious-like trill. The crickets are very difficult to capture and the small amount of material examined by Mr. A. N. Caudell of the U. S. National Museum and myself was tentatively pronounced a physiological form of *Anaxipha exigua*. A discussion of this cricket was made in my paper, "Physiological Differentiation in Overwintering Individuals of Certain Musical Orthoptera," *The Canadian Entomologist*, LXI, September, 1929, 195-198.

In 1929 further observations were made in a bog near Barcroft, Virginia, and additional material obtained. On the suggestion of Mr. B. B. Fulton that our material was perhaps identical with a cricket he had been studying in central North Carolina in similar habitats, and known as *Anaxipha pulicaria* Burmeister, careful comparisons of this additional material were made by Mr. Caudell with *Anaxipha exigua*.

This examination has led to a separation from *Anaxipha exigua* material on the basis of several characters. In both sexes all *exigua* material shows a more or less well-marked dark

longitudinal stripe along the lower half of the outer face of the hind femora. This stripe may vary in intensity, sometimes being very faint, but it is never absent. Likewise in *exigua* material the ovipositor is fully $\frac{1}{2}$ as long as the hind femora.

All material from the deep ground debris of the cold, wet bogs around Clarendon, and Barcroft, Virginia, consistently lacks this longitudinal dark stripe on the hind femora, and the ovipositor is distinctly less than $\frac{1}{2}$ as long as the hind femora.

The color and morphological differences, together with its restricted bog habitat, its occurrence in the adult form many weeks before the adults of *A. exigua*, and the distinctiveness of its trill in comparison with the notes of *A. exigua*, make it fairly certain that the cricket is the more southern species *Anaxipha pulicaria*.

This cricket has heretofore not been reported farther north than Raleigh, North Carolina, its range extending southward into Florida, Texas, Mexico and Jamaica.

With the final separation of these crickets from *A. exigua* and their identification as *Anaxipha pulicaria*, we have added to the Orthopteran fauna of the District of Columbia a cricket hitherto unknown in this region.

Cycloptilum trigonipalpus (Rhen & Hebard).

Near sundown on the evening of June 30, 1930, while reading, I heard a few shrill ringing sounds which finally attracted my attention as insect music. Later in the evening I again heard the same chirping sounds, and with a flash light traced them to the kitchen. The "singer" was finally located in a strawberry basket filled with currant stems and unripe currants—the debris remaining from fruit recently picked in the garden. The tiny cricket was finally captured and kept in a screened jar in my bedroom for the night. Occasionally I heard its leisurely delivered, shrill chirps, *tiiiii*, reminding me of the chirps of the jumping tree cricket (*Orocharis saltator*) in pitch, but of finer quality and less trilling tone.

This cricket was identified by Caudell as *Cycloptilum trigonipalpus* Rehn & Hebard, being the first record of this southern species for the vicinity of the District of Columbia. The northern-most reported occurrence is Petersburg, Virginia, south of Richmond. No other individuals have been seen or heard since this solitary individual appeared at Lyon Park, Virginia.

While it is possible that this individual may have been inadvertently transported by some motor carrier or other agency from points farther southward, where it is of general occurrence, there is quite as good reason to infer that all the localities of its northern-most distribution have not yet been determined.

In this connection it may be said that in the case of the little southern cricket *Anaxipha pulicaria*, its occurrence around Washington, D. C., which at the present time seems to be its northern-most limit, is likewise extremely variable and irregular. As a matter of fact, slightly favorable or unfavorable conditions near the limits of the range of a creature, may determine its presence or absence in a locality.

THE NORWAY MAPLE NEPTICULA (LEPIDOPTERA).

By E. P. FELT,

Director and Chief Entomologist, Bartlett Tree Research Laboratories,
Stamford, Conn.

This European insect, *Nepticula sericopeza* Zeller, determined by August Busck of the U. S. National Museum, first came under observation in America, June, 1928, through the persistent dropping of large numbers of Norway maple leaves.¹

An examination of these leaves showed that at the very lower part of the leaf stem for a distance of about half an inch, there was a somewhat characteristic, variable, sooty black discoloration and at a point almost exactly half an inch from the base of the leaf stem there was a minute, white, elevated, oval object suggestive of a fungus fruiting body and presumably consisting of dried sap which had exuded from the point of oviposition. The interior of the leaf stem from this point nearly to the very base was traversed by a very minute channel or mine about three-eighths of an inch long, and some at that time contained a nearly transparent, very slender larva about a sixteenth of an inch long and with a diameter of approximately one-fiftieth of an inch. The caterpillar has a light brown, semi-transparent head with strongly supporting chitinous rods and margins. The body segments are smooth, whitish, transparent and the posterior segment somewhat produced along the middle line and with sub-lateral, oblique, chitinous rods or spines and also a

¹*Nepticula sericopeza* Zeller, discovered by Dr. Felt in eastern United States and presumably a recent introduction from Europe, may be distinguished among the nearly three hundred described species of the genus by its coloration: Head reddish yellow; collar whitish; eyecape ochreous white; forewings blackish brown with base, an outwardly curved fascia before the middle and opposite costal and dorsal spots at apical third, white; underside of the forewing of the male with a large deep black sexscaling on basal half, containing a striking yellowish white, spoolshaped oblique spot. The genitalia of both sexes, typical of the genus, also present excellent specific characters.

AUGUST BUSCK.

sub-median, chitinous structure terminating in two curved rods.

The dropping of leaves continued till well toward the end of June and an examination of selected branches from a Norway maple some 60 feet high showed a somewhat general infestation throughout the tree, there being at that time approximately 10 per cent of the leaves infested. The earlier dropping was probably considerably in excess of this 10 per cent and it is believed that 25 per cent represents the minimum defoliation by the insect on the tree under observation. Attempts to rear the adult from these leaf stems and also from sod under the trees proved futile. Subsequent observations indicate that the insect is probably unable to complete its transformations in the leaf stems and that this habit is abnormal and occurs only when there are no seeds available for oviposition. The identification was made by collecting moths in June, 1929, and establishing them in cages on Norway maple. They produced the characteristic injury to the leaf stem and the correctness of this observation was confirmed by rearing large numbers from infested seeds or keys in 1930.

There was a heavy crop of Norway maple seeds in portions of the northeastern United States in 1930 and in mid-June large numbers of these dropped from the trees. An examination showed the same type of injury as had been observed in 1928 and 1929, on the leaf stems. These proved to be inhabited by a very similar larva to that observed two years earlier, except that it was larger. Infested seeds, when green, are easily recognized by the sooty discoloration, indicating galleries which usually start at one point, and upon breaking the seeds apart, there are usually burrows along the suture partly filled with somewhat characteristic reddish orange borings. Recently infested seeds generally have the minute white spot, presumably dried sap, as in the case of leaf stalks. The identity of the earlier found moths was confirmed by rearing from infested seeds. It is noteworthy that a very large proportion of the earlier dropping larger seeds, namely nearly 99 per cent, were infested, while of the smaller seeds falling at the same time, less than 14 per cent were infested. Moths were observed in greater or less numbers throughout July and into August, though none were found in September, indicating that possibly the dry weather the latter part of the year had caused the seeds to harden to such an extent as to make them unacceptable for oviposition. There were certainly two and possibly three generations. Tutt in *British Lepidoptera* (Vol. 1, page 344-45, 1899) states that the species is double or probably continuously brooded, adults appearing in April-May from hibernating larvae, again in June-July and a third in August. The moister climate of England might easily make possible another generation than occurs in

this country. They were also taken in the Stamford area from late May until into August.

The small, dusky, white-marked moths are a trifle over an eighth of an inch long when in the characteristic resting position. They have two somewhat indistinct silvery or whitish transverse bands and are most easily recognized by the fact that they are usually the more abundant small moths resting in the crevices of the bark of Norway maples. They remain quiet during most of the day, and when disturbed readily jump into the open mouth of a vial placed over them. They appear to be somewhat local, since the spraying of even one tree gives a very considerable freedom from infestation. The moths occur not only commonly on the rougher portion of the trunk, but also throughout the tree to some extent and on the leaves and fruit in mid-summer.

Larva. The full grown larva occurring in the seeds is three-sixteenths of an inch long, moderately stout, mostly pale yellowish green, shaded by the brown contents of the alimentary canal. The head is about three-fourths the width of the body segment and with well-developed jaws. Dorsally the head case has two sublateral tapering processes posteriorly, the sub-median margins thickened, the median sub-oval area membranous. Ventrally there is a median chitinous rod, very suggestive of the breast bone of the gall midge larva. At the posterior extremity, there is a chitinous frame consisting of several lateral rods, united by a central approximately circular structure. The larva moves rather readily and in this stage has a series of rudimentary true or prolegs, all apparently membranous.

Cocoon. The freshly made, pale orange yellow, oval cocoons have a major diameter of about three-sixteenths of an inch. The cocoons are flattened, the edges merging smoothly with the surface upon which it rests. There is usually a somewhat distinctly colored margin between the outer edge of the cocoon and the pupal case within. The older cocoons change in color gradually from a pale orange to a variable yellowish or whitish orange. There were found on one tree a few remnants of what appeared to be much older cocoons than any which could have been produced by the spring generation of larvae. These weathered to harmonize rather closely with the normal, somewhat variegated bark surface of the tree. The cocoons are spun commonly upon the bark, sometimes upon the seeds and even upon the leaves and may occur more or less throughout the tree. The insect hibernates in the cocoon. This habit makes a relatively wide distribution with nursery stock entirely probable and possible.

Distribution. The occurrence of this insect is most easily determined by examining the early fallen seeds. There is usually the minute white spot as on the leaf stems and the galleries

contain somewhat characteristic reddish orange borings or castings. It is easy by this means to secure records of a hitherto unsuspected wide distribution. Infested seeds were seen or received from the following localities:

New Hampshire: Portsmouth.

Massachusetts: Amherst, Ipswich, Lenox, Martha's Vineyard Island, South Hadley and Vineyard Haven.

Rhode Island: Barrington and Warwick.

Connecticut: Bethel, Bridgeport, Danbury, Fairfield, Greenwich, Hamden, Hartford, New Canaan, New Haven, Noroton, Norwalk, Ridgefield, Stamford, Thompson and Westport.

New York: Albany, Amawalk, Amenia, Bedford, Bronxville, Chatham, Croton Falls, Glen Cove, Haverstraw, Katonah, Lake George, New Hamburg, Mount Vernon, North Salem, Nyack, Paulding, Peekskill, Riverhead, Scarsdale, Syracuse, Tarrytown, Westbury, White Plains and Yonkers.

New Jersey: Plainfield and Red Bank.

Pennsylvania: Downingtown, near Philadelphia.

We have yet to learn of the occurrence of this insect west of Syracuse, although it was looked for in several places, including Cleveland, Ohio. This is possibly due to the infestation having been distributed from some eastern center. Seeds of other maples, especially the sugar maple and sycamore maple, were repeatedly examined without finding any evidence of the insect.

The wintering of this insect in cocoons upon the trees makes it very probable that a dormant oil application would practically eliminate the infestation. Applications in late May with a spray consisting of half pint of nicotine, 3 pounds of soap and two quarts of molasses to 40 gallons of water, gave a very promising degree of control. It killed adults and very probably prevented the issuance of moths from the cocoons. A dormant spray is probably more satisfactory.

A NEW SPECIES OF CHRYSOBOTHRIS INFESTING STRAWBERRY PLANTS (COLEOPTERA : BUPRESTIDAE).

By W. S. FISHER, *Bureau of Entomology, United States Department of Agriculture.*

Chrysobothris fragariae, new species.

Chrysobothris sp. Riley, *Insect Life*, vol. 5, 1892, pp. 17-18.

Chrysobothris pubescens Fall.,—U. S. Dept. Agric., *Official Record*, vol. 8, No. 24, 1929, p. 3 (misidentification).

Male.—Broadly elongate, subdepressed, moderately shining, uniformly dark brown, with a more or less distinct greenish bronze or coppery bronze tinge in certain lights, the elytra without or with only vaguely indicated longitudinal costae and greenish spots.

Head feebly convex, with the front rather broad and the sides obliquely narrowed to the vertex; occiput broad and longitudinally carinate; vertex and front flat, without impressions or carinae; surface rather densely, irregularly punctate, the punctures variable in size and well separated, sparsely clothed with long, very fine, semi-erect, cinereous hairs; intervals smooth; eyes large, narrow, moderately convex, equally rounded at bottom and top, and separated from each other on the occiput by about the same distance as between the antennal cavities; epistoma broadly, rather deeply, angularly emarginate in front, the lobe on each side broadly rounded; antenna extending to middle of pronotum, gradually narrowed toward apex, sparsely clothed with moderately long hairs, joints compact, transverse, and the third joint only slightly longer than the fourth.

Pronotum strongly transverse, one and three-fourths times as wide as long, widest near middle, and about equal in width at base and apex; sides rounded at apical angles, parallel along middle, and obliquely narrowed behind middle to posterior angles, which are obtuse; anterior margin strongly sinuate, the median lobe moderately produced and broadly rounded; base (visible part) broadly, arcuately emarginate at middle of each elytron, median lobe broadly rounded and subtruncate in front of scutellum; surface slightly uneven but without distinct depressions, rather densely, coarsely punctate, the punctures more or less confluent toward sides, and sparsely clothed with moderately long, erect, inconspicuous hairs; intervals finely, densely granulose. Scutellum very small, triangular, with the sides about equal in length.

Elytra distinctly wider than pronotum at base; sides broadly rounded at humeral angles, nearly parallel to apical third, then arcuately narrowed to the tips, which are conjointly, broadly rounded; lateral margins not distinctly serrate; humeri not prominent; base broadly, arcuately rounded; surface with small, moderately deep, basal depressions, three very vague greenish spots on disk, one in front and two behind, finely, irregularly punctate, the punctures denser on basal half, more or less transversely rugose, and sparsely, irregularly clothed with long, erect, cinereous hairs; intervals obsoletely granulose.

Abdomen beneath sparsely, coarsely punctate, sparsely clothed with long, recumbent, cinereous hairs; intervals nearly smooth; first segment convex at middle; last segment with the lateral margins finely serrate, without a submarginal ridge, but deeply, arcuately emarginate at apex. Prosternum with a broadly rounded, strongly declivous, median lobe in front, the surface densely, coarsely punctate, and rather densely clothed with long, fine, cinereous hairs; prosternal process nearly flat, strongly expanded behind the coxal cavities, and with a very large triangular tooth at apex. Femora robust; anterior pair with a large obtuse tooth on inner margin near middle, the exterior margin of tooth vaguely serrate. Anterior tibiae arcuate, with a rounded dilatation at apices; middle and posterior tibiae straight and cylindrical.

Female.—Differs from the male in being more robust, eyes more widely separated from each other on the occiput, antennal joints not quite so compact, last abdominal segment vaguely emarginate at apex, and the anterior tibiae without dilatations at apices.

Length, 6.4–8.6 mm.; width, 2.8–4 mm.

Type locality.—Grand Mound, Washington.

Other localities.—Washington: Easton; White Salmon; Medical Lake. Idaho: Coer d'Alene; Moscow.

Type, allotype and paratypes.—Cat. No. 43175, United States National Museum. *Paratype*.—Collection H. C. Fall.

Described from thirteen examples, the type (male), allotype, and four paratypes from the type locality, reared from strawberry plants during March to July, 1930, by William W. Baker; two paratypes from White Salmon, Washington, reared from strawberry plants during July, 1930, by William W. Baker; two paratypes from Coeur d'Alene, Idaho (Bureau of Entomology No. 4765), reared from crowns of Sharpless strawberry plants sent to the Bureau by H. T. Back during 1890 and 1891; one paratype collected at Moscow, Idaho, by J. M. Aldrich; one paratype collected at Easton, Washington, by A. Koebele; one paratype collected at Medical Lake, Washington, July 14, 1920, by R. C. Shannon.

This species is closely allied to *pubescens* Fall, but differs from that species in being more uniformly bronzy brown, dorsal surface more densely punctured, foveae on elytra if present not impressed, and the costae on the elytra only feebly indicated.

The specimens examined show considerable variation in size, and in some of the examples the green spots and longitudinal costae are vaguely indicated, whereas in others these are not indicated. The specimens from the type locality are rather constant except in size, but some of the examples from the other localities show considerable variation from the type. In some examples the tips of the elytra are separately rounded, the sides of the pronotum slightly variable in shape, and in some of the females the sides of the elytra are slightly expanded behind the middle.

This species has been misidentified as *pubescens* and is probably confused in some collections under that name, but a specimen was sent to H. C. Fall, who has kindly compared it with his type and in a letter writes as follows: "It is not my *pubescens* and does not seem to be like anything else in my collection." It was first reported as boring into the crowns of Sharpless strawberry plants by H. T. Back, from Coeur d'Alene, Idaho, on September 1, 1890, and during that and the following year a considerable number of infested plants were sent to the Bureau of Entomology at Washington for rearing. In the Bureau file under number 4765 are the notes on this material made by L. O. Howard and Theo. Pergande, and these notes show that adults were reared as well as a lepidopteron, a tachinid, an anthomyiid, several small muscids, and a number of braconids, some of which were probably parasitic on the *Chrysobothris* larvae. Riley (1892) published a short note on this species from the above material. In the National Museum collection was an old speci-

men from Moscow, Idaho, labeled under the manuscript name *fragariae* by E. A. Schwarz, and this name has been retained for the species. Recently the species has been reported as damaging strawberry plants in Washington, and adults have been submitted for identification by William W. Baker. From all the records available it seems that this species is restricted in its larval habits to strawberry, but it probably also infests some closely allied wild plant.

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EUPHYLLURA ARCTOSTAPHYLI SCHWARZ AND EUPHYLLURA NEVEIPENNIS (SCHWARZ) (HOMOPTERA: CHERMIDAE).

A DIFFERENCE IN INTERPRETATION.

By F. D. KLYVER,

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The genus *Euphyllura* is represented in North America by four known species. One of these, *E. arbuti* Schwarz, occurs on madrone, *Arbutus menziesii* Pursh. apparently throughout the range of its host (1, 2, 4, 8). Another species, *E. arbuticola* Crawford, which is very closely related to the first named species, occurs on *Arbutus arizonica* Sargent in Arizona. Available records (1, 2, 8) indicate that it likewise is found ubiquitously with its host. A third species, *E. arctostaphyli* Schwarz, has been frequently taken from *Arctostaphylos pungens* H. B. K. (1, 8) and from various other species of manzanita (2) chiefly in California but also as far northward as Washington and eastward in Wyoming (1), Colorado and Arizona (1, 2, 8). The fourth representative of the genus, *E. neveipennis* (Schwarz) has hitherto been considered a variety of *E. arctostaphyli* Schwarz (1, 2, 8). However, it differs significantly from this species in many important characters and should, for the reasons stated below, be considered as a separate species. Following the original description of *E. arctostaphyli*, Schwarz (8) says with reference to this supposed variety, "a remarkable variety occurs in California which may be readily mistaken for a different species and which, for this reason, deserves especial mention and a distinct varietal name." Contrary to this opinion, the danger apparently lies not in mistaking it for a different species, but in failure to recognize it as being of specific rank. This is evident from an interpretation and diagnosis by the methods here described.

SPECIMENS.

Numerous specimens of *E. arctostaphyli* Schwarz, including both adults and nymphs, are at hand for study from Placer-ville, Eldorado County, Tesla, Alameda County, Clark's Canyon, San Mateo County, Black Mountain, Stanford University,

Santa Clara County, Mount Hamilton, Santa Clara County, Pine Ridge, Fresno County, Coalinga, Fresno County, General Grant National Park, Tulare County, and Julian, San Diego County, all of which are California localities. Adult specimens of *E. neveipennis* (Schwarz) are available from "Deer Creek Inn," Placerville-Lake Tahoe road, Eldorado County, and from West Point, Calaveras County.

METHODS.

The general method employed in the study of the Chermidae has been fully described elsewhere (3, 4, 5, 6, 7). In the study of the adults it consists of making several different kinds of mounts. Where the material is limited all available specimens are cleared in caustic potash, dehydrated in 95% alcohol, stained in magenta, cleared in carbol-xylene, and mounted in balsam on slides, the wings being merely cleared in carbol-xylene and then mounted in balsam under a separate cover-glass, together with the head, on the same slide with the rest of the body. When the material is more abundant separate mounts of entire specimens are made in dry cells on ordinary slides. In these cells the specimen is oriented in various ways to best expose the lateral, dorsal, or ventral aspects as may be desired and is then fixed in position with white shellac. Also, where long series of specimens are at hand, mounts of corresponding structures from different specimens, the fore wings for instance, are mounted separately for variational studies.

The essential purpose to be served by whatever technique is employed is the preparation of the specimen for complete and exhaustive study. In certain cases where it seems advisable, this means preparation for study with the greatest magnifications obtainable with the compound microscope. An instance of this kind is found below in the comparative study which was made of the wing membranes of the two species here under consideration.

EUPHYLLURA Forster.

The three species of this genus before me agree in all particulars save one with the generic characters as given by Crawford (1). This one exception pertains to the antennae. Crawford describes the antennae as being short and "thick." Proportionate to the size of the insect in each case of the species represented in my collection, the antennae are about as long as the width of the head and are, therefore, properly considered comparatively short. On the other hand, the first and second antennal segments of each of the species here considered are relatively thick (about .1 mm. and .08 mm. respectively in *E. arctostaphyli*, for instance), and all the other antennal segments

are comparatively very small in diameter (about .02 mm.) as compared with a total length of the antennae of .8-.9 mm. in the same species.

DESCRIPTION OF PRINCIPAL DIAGNOSTIC CHARACTERS.

Euphyllura arctostaphyli Schwarz.

Length to tip of folded wing 3.2-3.7 mm., length of fore wing 2.0-2.6 mm., length of body mounted on slide 3.3-3.7 mm., width of fore wing .9-1.2 mm., width of head .8-1.0 mm., length of antennae .8-.9 mm. General color throughout reddish brown with lighter markings on the head, thorax, and fore wings, the latter frequently being present as transverse bands (Plate 9, figs 6 and 7). Characters of the genus well developed.

Head slightly broader than thorax, strongly deflexed, irregularly wrinkled or corrugated, sometimes very strongly so (Plate 9, fig. 2), pubescent with many small setae uniformly distributed over the general surface; genae about a third as long as vertex, rectangular in shape, forming a uniformly smooth surface with and scarcely separable from the vertex; antennae ten-segmented, slender, as long as or very slightly shorter than width of head, the first and second segments more than three times the diameter of the other segments, segments 4, 6, 8, and 9 having moderately conspicuous sensoria.

Thorax strongly arched, the general surface covered with numerous closely set, rounded, and variously shaped, small chitinated plates, pubescent with small setae distributed over the entire surface. Legs comparatively stout, the femur of the hind and middle pair of legs having a double or single row of setae and three sensoria each on the mesal side, the femur of the anterior pair having a less well defined row of such setae and but a single sensorium; the posterior tibia without a spur at the base, with seven or eight small black teeth at the apex, and two small black claws on the posterior tarsus. Fore wings slightly more than twice as long as broad, rhomboidal, coriaceous in texture, opaque, and variable in color (Plate 9, figs 6, 7, and 9), the membrane being covered with small ovulate chitinated plates of considerable thickness, each one of which apparently has at its apex a very minute seta set in a relatively large and conspicuous socket, the general surface of the membrane bearing sparsely distributed and relatively large setae, the venation as illustrated by Crawford (1) and by Schwarz (8), the veins beset biserially with relatively large setae and generally obscured by the chitination. Hind wings relatively large, fumate, with the venation as illustrated (Plate 9, fig. 8), the veins being a darker brown than the membrane and rather thick at the proximal end but becoming obscure apically, the membrane delicately membranous in the apical region, the antero-proximal margin bearing a row of stout setae, the basal vein (R-M-Cu) and about half of the radius bearing setae, the wing membrane beset with numerous minute points.

Abdomen with the tergites and sternites equally and moderately to strongly chitinated, the tergites bearing a singly row of hair-like setae along the posterior margin, the sternites having several rows of such setae located chiefly toward the posterior margin. Male genitalia relatively large, the proctiger or anal valve distinctly longer than the claspers, elongate-oval in lateral aspect, the

anterior portion heavily chitinized, the posterior margin membranous and frequently shrunken or completely collapsed in dried or mounted specimens; the claspers wide at the base, abruptly constricting in the proximal third, then gradually widening to become roundly spatulate in the distal half, the outer surface bearing a number of fine sparsely scattered setae, the inner face covered with numerous very closely set short, stout, downwardly pointing setae (Plate 9, figs. 13 and 14). Female genital segment (Plate 9, fig. 11) about two-thirds of the length of the rest of the abdomen, heavily chitinized, the dorsal valve conspicuously longer than the ventral valve, the dorsal valve bearing scattered posteriorly pointing setae over the general surface, and on the apical third bearing many short, stout dorsally, anteriorly, and ventrally pointing setae, the apex bluntly rounded; ventral valve sharply pointed apically, with scattered setae over the general surface, the setae being more numerous and crowded toward the apex.

Euphyllura neveipennis (Schwarz).

Length to tip of folded wing 4.0–4.1 mm., length of fore wing 3.1–3.4 mm., length of body mounted on slide 4.1–4.5 mm., width of fore wing 1.5–1.6 mm., width of head 1.1–1.3 mm., length of antennae 1.1–1.3 mm. General color very light brown with pinkish, reddish, and light to deep chocolate brown markings, vertex and genae cream-white, the margins of the head, the eyes, the first two and the last antennal segments dark brown, the thorax with four conspicuous and constant dorsal and longitudinal chocolate brown strips, the wings white with very small blood-red marginal spots, abdomen light reddish brown color with the genital segments generally darker. The characters of the genus well developed.

Head slightly wider than width of thorax, strongly deflexed, the general surface covered by weakly chitinized plates (Plate 9, fig. 4), pubescent with small setae uniformly distributed over the entire surface but becoming larger toward the ends of the genae, the genae about one half as long as the vertex with which they form a uniformly smooth surface and from which they are, therefore, scarcely separable, the ends of the genae broadly rounded and slightly bulging laterad; antennae ten-segmented, slender, as long as width of head, the first and second antennal segments more than three times the diameter of the other segments, segments 4, 6, 8, and 9 having moderately conspicuous sensoria.

Thorax strongly arched, the general surface covered with numerous variously shaped strongly chitinized and closely set plates, pubescent with small setae scattered over the general surface. Legs rather stout, the femur of the hind and middle pair of legs with a double or triple row of setae and three sensoria on the mesal side, the front pair of legs without setae in such definite rows and with but a single sensorium; base of posterior tibia without a spur, apex of the posterior tibia with nine or ten small black teeth, the posterior tarsus with two small black claws. Fore wings slightly more than twice as long as broad, rhomboidal but rather broadly rounded at the apex, very slightly coriaceous in texture, semi-transparent and uniformly white except for occasional and irregularly spaced, small blood-red marginal spots, the wing membrane densely pebbled with very small, weakly chitinized plates (Plate 9, fig. 8), venation similar to and not as

obscure as that of *E. arctostaphyli* Schwarz, the veins beset biserially with small setae, the membrane bearing setae around the entire margin and sparingly on the wing membrane at the proximal end. Hind wing similar to that of *E. arctostaphyli* Schwarz in size and shape, pure white and very delicately membranous, the venation discernible only toward the proximal end where the veins are feebly developed as ridges, the membrane beset throughout with numerous exceedingly minute points.

Abdomen with the plates only moderately chitinized, the tergites with a single row of small setae along the posterior margin, the sternites with similar setae scattered chiefly over their posterior half. Male genitalia large, the procritiger distinctly longer than the claspers, elongate-oval in lateral view, the anterior portion heavily chitinized and the posterior margin membranous, the claspers peculiarly "slipper-shaped" in lateral aspect as illustrated (Plate 9, figs. 16 and 17), the outer surface bearing relatively few scattered setae, the inner surface being densely beset with setae of two distinct sizes distributed as shown (Plate 9, fig. 17). Female genital segment similar to that of *E. arctostaphyli* Schwarz (Plate 9, fig. 11) except that the dorsal valve is only very slightly longer than the ventral valve, and except for the type and distribution of the setae, those of this species all being of the same type and being densely and uniformly distributed over the entire genital segment, becoming more densely crowded toward the apex.

TAXONOMIC CONSIDERATIONS.

Schwarz (8) and later Crawford (1) have both considered *E. neveipennis* (Schwarz) a variety of *E. arctostaphyli* Schwarz and in so doing have each apparently based their interpretations on the superficial resemblances between these two closely related species. Schwarz has described with painstaking care the color variations found in each of the species and evidently considers the color pattern as being of some importance. He has also noted some differences in the general appearance of the fore wing venation. The sexual characters, on the other hand, are given scant attention by him. Crawford has similarly dealt chiefly with the same characters emphasized by Schwarz, although he notices some differences in the claspers or forceps of the male genitalia, but, as it happened, either he has failed to see them correctly or else he has misinterpreted certain essential characters of the genitalia. Furthermore, Crawford had made no mention of the significant differences between the female genitalia of the two species, and also has made no note of the differences present in other less important characters.

The writer has on several occasions (5, 6, 7) stated his opinion as to the relative taxonomic value of color pattern and the sexual characters in the Chermidae. In rare and isolated cases only is coloration and color pattern of taxonomic importance. Conversely, in exceedingly rare cases are the sexual characters without great significance. The writer has also called attention

to the importance of wing structure (5, 7) totally aside from the type of wing venation present in individual cases.

The principal characters on the basis of which *E. neveipennis* (Schwarz) is here distinguished as a separate and distinct species instead of a variety of *E. arctostaphyli* Schwarz are obvious when revealed by the technique here employed.

First in significance and importance are the distinctive differences of both the male and the female genitalia. In the males, the claspers differ both in form and in the type of setae present and in the distribution of the setae, these setae entirely covering the inner face of the clasper in both species instead of merely forming a "fringe of hairs" as stated by Crawford (1). The genitalia of the females are superficially alike in size and general proportions although the difference in the relative lengths of the dorsal and ventral valves in the two species would ordinarily be considered significant. Aside from this, the difference in the type and distribution of the setae is regarded as very important, *E. neveipennis* having only one type of setae all of which are directed posteriorly, whereas *E. arctostaphyli* has two distinct types of setae, the longer hair-like type merely constituting the general pubescence of the genitalia while the smaller, stouter setae, judging from their form and the directions in which they point, are obviously structures of special function, which are possibly of importance in mating. The second most important basis for a separation of these two species is found in the structure of the fore wing and to a less extent the hind wing of each species. In *E. neveipennis* what has been described by Schwarz (8) and Crawford (1) respectively as a "fine white powder" and a "rather white-pulverulence" is in reality numerous very small colorless chitinized plates scattered densely over the entire wing membrane (Plate 9, fig. 8). Contrasted with this in the wing of *E. arctostaphyli* the fore wing membrane bears numerous much larger chitinized plates of rather unusual structure (Plate 9, figs. 9 and 10). This contrast in structure is very apparent in Figures 8 and 9, these illustrations being drawn to exactly the same scale with the camera lucida. Incidentally, the hind wings also differ in important details as stated above. The third most important basis of distinction between these two species is found in the differences in size and relative proportions. This is evident from the measurements recorded above and is equally apparent from comparisons of Figures 1 and 2, and Figure 14 with Figures 16 and 17, all of which are drawn accurately to the same scale.

Other noteworthy differences of less significance than those stated above are found in the somewhat different form of the heads (Plate 9, figs. 1 and 3), in the difference in the sculpturing of the heads (Plate 9, figs. 2 and 4), in the differences in the setae on the femurs, in the difference in the number of teeth on

the apex of the posterior tibiae, and in the different degree of chitinization of the abdominal plates.

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EXPLANATION OF PLATE.

(Drawn with camera lucida by the author.)

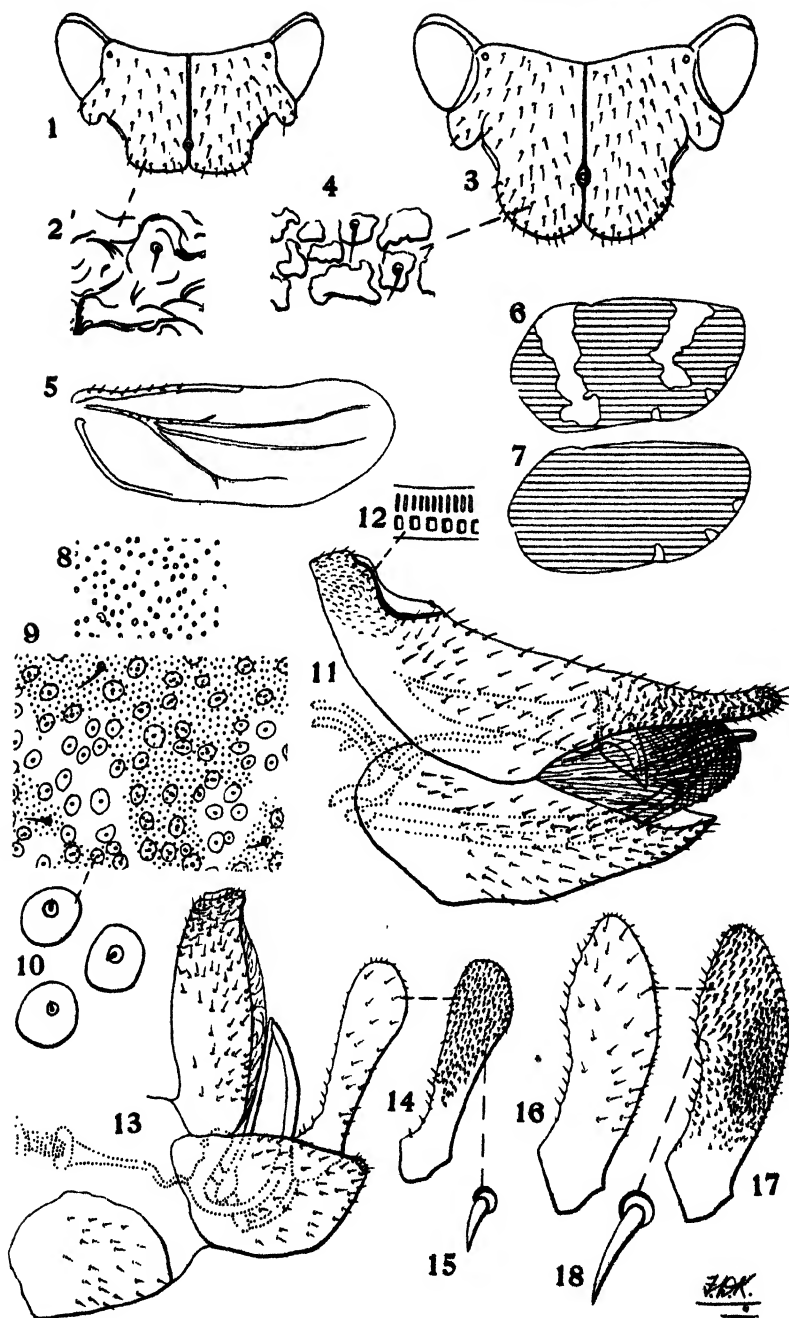
All drawings of the corresponding structures are made to the same scale and are therefore comparable.

Euphyllura arctostaphyli Schwarz.

1. Cephalic view of head; 2, rugose surface of genae; 5, hind wing; 6 and 7, fore wings, diagrams illustrating the degree of contrast in wing coloration, shaded area reddish brown, unshaded areas white or nearly white; 9, detail of membrane of fore wing magnified about 500x, brown pigmentation shown by stipple, circles each representing a chitinous scale with a minute setae at its apex; 10, detail of chitinous scales magnified about 1200x; 11, genital segment of female; 12, detail of circum-anal ring of pores; 13, genital segment of male; 14, inner face of clasper showing distribution of setae; 15, seta greatly magnified.

E. nevadensis (Schwarz).

3. Cephalic view of head; 4, chitinous plate-like sculpturing of genae; 8, detail of membrane of fore wing magnified about 500x; 16, outer aspect of clasper of male; 17, inner face of clasper; 18, seta greatly magnified.



A NEW SPINNING MITE ATTACKING ASPARAGUS PLUMOSUS
IN FLORIDA

BY E. A. MCGREGOR,

Of the Bureau of Entomology, United States Department of Agriculture.

In the course of their duties at the Federal laboratory at Orlando, Florida, Mr. W. W. Yothers and Mr. C. B. Keck observed a mite causing serious damage to the ornamental plant *Asparagus plumosus*. During the seasons of 1928 and 1929, these entomologists sent to the present writer specimens of the *Asparagus* mite and a description of the appearance and work of the pest in the field. Critical study has established that the mite is new to science, and its characters are such that it can hardly be placed in any known genus. Consequently the following new genus is created to receive the present new species:

DIVARINYCHUS, new genus.

This genus is thus far represented by a single species from Florida.

Spinning mites with empodial claw very deeply split into two equal, strong, divaricate, sickle-shaped fang-like prongs, each prong bearing dorsally two exceedingly fine hair-like spurs which hardly equal in length that of the prongs. Collar trachea extending downward first as a rather straight narrow tube, then bending at an angle of about 155° , increasing gradually in caliber to form enlarged distal portion. Penis with basilar lobe absent from usual position; with corresponding lobe ventrally opposite usual position of basilar lobe; bearing distally a sharp-pointed barb.

Type.—*Divarinychus floridensis* McGregor.

Divarinychus floridensis, new species.

Female.—General body color salmon pink, varying to greenish-yellow in certain old individuals; dark colored blotches laterally, probably due to dark material contained in internal organs; legs and palpi same color as body. Eyes carmine, directly above coxae II. Body oval, widest across hind margin of cephalothorax, in length about 0.41 mm. Body setae conspicuous. "Thumb" of palpus thicker than long, bearing at its tip a "finger" which is thicker than long, and the base of which is only about one-fourth less thick than that of the "thumb" at tip; the dorsal "finger" or sensilla is at least half again the length of the terminal "finger"; the customary pair of digituli arise from the dorso-distal angle; a short hair arises laterally near the tip of the "thumb," and a pair of hairs arise dorsally between the dorsal sensilla and the base of the "thumb"; the claw of the penultimate joint reaches to the dorsal "finger." Legs a trifle shorter than usual, quite hairy; femur 2 1-5 times as long as thick, barely exceeding the tarsus; tibia barely exceeding the patella, which is about one-half again as long as the trochanter: Relative lengths of the joints of foreleg as

EXPLANATION OF FIGURES.

Divarinychus floridensis McGregor.

Fig. 1, tarsal appendages in profile; Fig. 2, foreleg viewed laterally; Fig. 3, palpus (♀) and its appendages, viewed laterally; Fig. 4, tarsal appendages viewed from above; Fig. 5, collar trachea; Fig. 6, penis, viewed laterally.



follows: Trochanter, 14; femur, 33; patella, 20; tibia, 22; tarsus, 32. Tip of tarsus (female) with an empodial claw which is split almost to its base into two equal strong, divaricate, sickle-shaped prongs; each of these divisions bears dorsally two exceedingly fine hair-like spurs which hardly equal in length that of

the prongs. The usual series of four tenent hairs arise from the onychium at the sides of the empodial claw base. Collar trachea extending downward first as a rather straight narrow tube, then bending backward at an angle of about 155° , increasing gradually in caliber to form the enlarged distal portion. Egg salmon pink, spherical, without markings.

Male.—General body color salmon pink; irregular dark blotches laterally. Legs same color as body; front legs longer than other three pairs. Body cuneate-oval, widest across hind margin of cephalothorax, in length about 0.26 mm. Eyes dark carmine. Penis with inner lobe rod-like, about twice as long as shaft; basilar lobe absent from its usual position, but with a corresponding lobe situated ventrally at a point opposite the usual position of the basilar lobe; shaft proximally about three times as thick as inner lobe and tapering distally; hook bent upward at nearly right angles to shaft, and in turn deflected distally to form a sharp-pointed barb.

Type slide.—Cat. No. 1004, U. S. N. M.

The type material is from Longwood, Florida, February 8, 1928, from *Asparagus plumosus*, collected by C. B. Keck. The same species has been received from the same host from Orlando, Florida. Mr. W. W. Yothers of Orlando has always maintained that this mite is distinct from other red spiders occurring in Florida. Messrs. Yothers and Keck write that, so far as they know, "this species has not been taken on any plant other than *Asparagus plumosus*, but it probably occurs on many other plants." The injury to the *Asparagus* "fern" occurs chiefly to the more tender growth and young shoots, and where the infestation is heavy the color of the plant is changed from green to whitish.

TWO NEW SPECIES OF PARASITIC HYMENOPTERA (BRACONIDAE) FROM OHIO.

By F. DeGANT.

SUBFAMILY ROGADINAE.

Rogas granulata, new species.

This species can be separated from most of those already described, by its more slender habitus. Its entire body including palpi and legs, except the parts specified below, is granular. The pronotum is also less declivous anteriorly than usual, giving the thorax an appearance quite different from that so characteristic of *R. parasiticus* Norton, *R. terminalis* Cresson, and *R. abdominalis* Cresson. In habitus as well as in having the 4th tergite strongly striated this species resembles *R. aciculatus* Cresson but is at once distinguished by its dark markings.

Female.—Length 4.5 mm.; anterior wing 4 mm. Antennae 47 jointed, the joints all two or more times as long as thick. Head transverse and clothed with scattered hairs; posterior orbits about one-half the transverse diameter of

the eyes; malar space as long as two-thirds the height of the eyes; eyes elliptical and of medium size; clypeus small, separated from the face, convex, the foramina distinct. Ocelli small, the ocell-ocular line about equal in length to the post-ocellar line and about one-half the length of the ocell-occipital line. The hypostomal carinae sharply defined and much higher than the occipital carina. The face below the antennae for one-half the distance to clypeus transversely striated, the continuity of the striae broken by a short median carina. Pronotum not declining sharply anteriorly; propleuron obliquely rugose below; mesonotal lobes not prominent, the notauli weakly defined and ending in a finely longitudinally striated area in front of the scutellum; an area below the anterior wings rugose. Propodeum rather long and nearly flat to its apical third where it becomes sharply declivous; median carina distinct. The first four segments of abdomen striate, the median carina ending at apex of the third tergite, all segments beyond the fourth retracted. The second abscissa of radius twice as long as the first; the width of the second cubital cell equal to two-thirds its length; the second abscissa of cubitus, the first transverse cubitus, and the recurrent vein subequal in length; that portion of the first abscissa of discoidal vein between the basal vein and the nervulus one-half the length of nervulus; sub-mediellian cell half as long as the mediellian. Thorax beyond a line drawn from the apex of postscutellum to the posterior edge of the procoxal fossae, the middle and hind coxae, the propodeum except a basal spot on each side, first and second abdominal tergites entirely, basal three-fourths of third tergite, and a plano-convex area across the base of the fourth tergite, reddish testaceous. All trochanters, femora and tibiae at their bases, and proximal four joints of tarsi, slightly paler testaceous; balance of body and legs deep black; wings hyaline, veins and stigma brownish black, the stigma with a pale spot at base. Antennae fusco-testaceous. Palpi blackish.

Mag.—42 x 102x.

Type-locality.—Cleveland, Ohio.

Type.—Cat. No. 43176, U. S. National Museum.

Described from one female taken on cabbage infested with *Autographa brassicae*, July 14, 1930.

SUBFAMILY MACROCENTRINAE.

Macrocentrus harrisi, new species.

This species in color is somewhat like *M. pyraustae* Viereck and *M. longicornis* Provancher but can be separated from both of them by the long ovipositor, the shape of the eyes and the color of the dorsum of abdomen.

Female.—Length 4.5 mm.; exerted portion of ovipositor 8 mm.; anterior wing 4 mm. Head viewed from above transverse; viewed from in front about as broad as high, narrowed below, the vertex raised above the level of eyes. Whole head smooth and shining, the face below antennae with a few weak setigerous punctures. Clypeus convex and clothed with a few long hairs. Eyes ovate. The malar space nearly one half the length of the eyes.

Antennae with about 45 joints; the first joint of flagellum one and one-half

times as long as the second, about six or seven times as long as thick; apical joints about twice as long as thick. Ocelli small, the distance between the lateral ocelli about equal to the distance from lateral ocellus to median ocellus; ocellocular line one and one half times the postocellar line. Scutum and scutellum mostly polished and impunctate; notauli distinct, punctate and ending in a punctate depression at middle of mesoscutum. Scutellar groove shallow, crenulate. Mesopleuron polished, the sternaulus wide and rather weakly punctate. Propodeum rugose, the lateral carinae slightly defined at apex. Metapleuron more coarsely sculptured on posterior half than anteriorly. Hind basitarsus equal to, or greater in length, than the following joints combined. First abdominal tergite with median depression at base, the distance between its spiracles equal to the distance from spiracle to base of tergite. First three tergites aciculate-striate, the following tergites very faintly shagreened. Radial vein arising a little beyond middle of stigma, its first abscissa a little less than half the length of second.

Color black. Scape, pedicel, base of mandibles, palpi, legs including all coxae, and the first three sternites of abdomen stramineous; hind tibiae and all tarsi fuscous. Wings hyaline, the veins brownish black; stigma nearly uniformly black but with a small area at base indistinctly paler.

Mag.—34 x 102x.

Type-locality.—Bedford, Ohio.

Type.—Cat. No. 43170, U. S. National Museum.

Described from two females, type and one paratype, collected by the writer at Bedford, Ohio, June 27, 1930.

The species is named for Mr. Joseph Porter Harris of Cleveland, Ohio, an advocate of this science.

Many thanks are due Mr. A. B. Gahan, U. S. Bureau of Entomology, for his criticism of the manuscript.

CONCERNING SOME TINGITIDAE FROM THE PHILIPPINES (HEMIPTERA), WITH NEW SPECIES.

By CARL J. DRAKE, *Ames, Iowa.*

This paper contains notes on nine species of Tingitidae from the Philippine Islands, three of which are described below as new. I am indebted to the late Dr. C. F. Baker of the Philippine Islands and to the United States National Museum for the privilege of studying the specimens.

Paracopium philippinensis, n. sp.

Dark fuscous-brown, the paranota and costal area of elytra brownish testaceous with transverse nervelets mostly fuscous-brown. Antennae rather long, moderately stout; segment I slightly thicker and a little longer than II; III slightly swollen towards apex, the short golden hairs closely appressed and not very distinct; IV moderately swollen, clothed with much longer, more slender,

and much more prominent hairs; proportions, 12: 9: 64: 34. Rostrum extending a little beyond anterior coxae; rostral channel open behind. Bucculae closed in front, more or less brownish testaceous. Head fuscous-brown; posterior spines short, yellowish, directed forward, contiguous with head, extended a little beyond posterior margins of eyes; median spine greatly reduced or entirely wanting; anterior pair stout, short, conical, directed inwardly, their tips frequently touching.

Pronotum coarsely pitted, strongly swollen, tricarinate; lateral carinae slightly curved, constricted a little behind the humeri; collum very distinct, reticulate, a little lighter in color, slightly emarginate in front. Paranota very narrow, composed of a single row of small areolae. Wings clouded, considerably longer than abdomen. Elytra with areas distinctly marked off; costal area moderately wide, uniseriate, the areolae hyaline; subcostal area mostly biseriate, some places triseriate; discoidal area bounded by a prominent costate nervure, the outer margin nearly straight, narrowed at both base and apex with four areolae at widest part; sutural area with areolae considerably clouded with fuscous. Legs very dark fuscous-brown.

Length, 3.83 mm.; width, 1.17 mm.

Holotype (male) and *allotype* (female) Island Sibuyan, Philippine Islands, Baker collection, U. S. N. M., Washington, D. C. *Paratypes* (four specimens), taken with type, in collections of U. S. N. M. and writer. This species is probably most closely allied to *P. lewisi* Distant from which it differs in proportional lengths of the antennal segments.

Serenthia vicinalis Drake.

Female, Mt. Maquiling, Luzon, Philippine Islands, Baker collection.

Cromerus bakeri, n. sp.

Slightly larger than *C. kalshoveni* Drake but differing in having shorter antennae, slightly less tumid pronotum, very differently formed lateral margins of anterior lobe of pronotum, and distinct lateral carinae on posterior portion of pronotum. Head short, black, with golden scalelike pubescence on the median portion. Posterior spines appressed, directed anteriorly, extending to the middle of eyes. Rostrum extending to intermediate coxae. Antennae moderately slender, shortly pilose, ferruginous brown, the apical and first two segments a little darker; proportions, 12: 9: 56: 35. *

Body ferruginous brown, somewhat shiny, clothed with scale-like, golden, decumbent pubescence. Pronotum strongly swollen, very shiny, coarsely pitted, narrowed anteriorly; median carina very prominent, the lateral short, slightly divaricating, extending from tumid elevation to posterior margin. Collum very prominent, strongly raised, jointly raised along the median line with median carina, with a row of rather large cells along the anterior margin. Calli very strongly depressed, black. Pronotum with a large, thick, round, carinalike structure on each side of anterior lobe connecting the lateral margin

with collum, the carina forming two large opaque cells on each side. Flytra rather dull, a little longer than abdomen, jointly rounded behind; nervures of discoidal area dark fuscous, the areolae opaque; costal area narrow, uniseriate, the areolae a little larger and lighter in color at widest part; subcostal area biseriate; discoidal area narrowed at both base and apex, widest near middle, outer margin slightly curved, areolae not arranged in very regular rows. Wings a little longer than abdomen, smoky. Legs moderately long, dark ferruginous brown.

Length, 4.68 mm.; width, 1.68 mm.

Holotype, female, Island Samar, Philippine Islands, collected by C. F. Baker, in writer's collection. The antero-lateral margin of the pronotum separate this species at once from the known species of *Cromerus* Distant.

***Cromerus kalshoveni* Drake.**

Female, Butuan, Mindanao Islands, Philippine Islands, Baker collection. This species has been recorded heretofore only from Kediri, Java, collected by L. Kalshoveni, on *Vitex heterophylla* Roxb.

***Cromerus invarius* (Walker).**

Fifty-five specimens, Butuan, Mindanao Island and Island Samar, Philippine Islands, collected by C. F. Baker, U. S. N. M. Up to the present time, this species has been recorded only from the type locality, New Guinea. Mr. W. E. China, who has kindly compared a female of the above series with Walker's type in the British Museum of Natural History, London, states, "Very closely allied to if not identical with *C. invarius* Walk. and differing only in slightly smaller size and in rather shorter and more robust fourth antennal segment." As the long series of specimens shows a little variation in size and length of the last antennal segment, it seems advisable to identify the Philippine specimens as *invarius*. The male genital structures of the species of *Cromerus* should be studied.

C. invarius Walker has a much longer body and also longer antennae than *kalshoveni* Drake or the new species described below. The fourth antennal segment of *invarius* is also considerably longer; the scalelike, golden, decumbent pubescence of the antennae is very short and not very conspicuous.

***Diplocysta nubilia* Drake.**

Singapore, Straits Settlements (six specimens), and Cuernos Mts., Negros, Philippine Islands (one specimen), Baker Collection. The Singapore specimens are from the type locality and were probably collected with the type (female).

***Cysteocheila pictus* (Distant).**

Female, Sandakan, Borneo; female, Mt. Maquiling, Luzon, Philippine Islands, Baker collection.

***Stephanitis quercus* Bergroth.**

Baguio, Benguer, Philippine Islands (two specimens), Baker collection.

***Tingis buddleiae*, n. sp.**

Elongate-ovate, brownish testaceous, frequently with whitish exudations on head, pronotum, and to a more limited extent on reticulations, clothed with long, fine, somewhat decumbent hairs, those along the lateral margins of paranota and elytra longer, bristly and almost spinelike. Head covered with whitish exudation, adorned with five long erect spines, the anterior pair converging. Rostrum reaching between posterior coxae; intermediate and posterior legs rather widely separated. Bucculae almost contiguous in front. Antennae moderately long, stout, widely separated at base, brownish, beset with long setae; segments I and II considerably swollen, the latter shorter and slenderer; III tapering a little towards apex, two and a half times as long as IV; proportions, 7: 5: 34: 14. Legs moderately stout, brown, the tarsi darker.

Pronotum brown, closely and rather finely pitted, slightly swollen through disc, tricarinate; each carina composed of one row of very small areolae; lateral carinae converging posteriorly; median carina raised anteriorly, forming a small rooflike hood, the anterior margin almost truncate. Paranota rather broad, slightly reflexed, the outer margin jointly rounded with both anterior and posterior margins, projecting a little anteriorly beyond pronotum, triseriate in front, biseriate at humeri. Elytra broad, slightly narrowed posteriorly; costal area broad, triseriate, the areolae fairly large and arranged in regular rows; subcostal area biseriate, the areolae distinctly smaller; discoidal area finely reticulated, slightly impressed, bounded by a prominent vein, with five or six rows of cells at its widest place, narrowed at both base and apex.

Length, 3.51 mm.; width, 1.59 mm.

Holotype (male), *allotype* (female), and one *paratype* (male), Los Banos, Philippine Islands, Baker collection, U. S. N. M. *Paratype*, female, Mt. Makling, Luzon, writer's collection. This species was collected on *Buddleia asiatica* Lour.

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